





## Lectures on Practical Mining in Germany.

## CLAUSTHAL MINING SCHOOL NOTES—No. XII.\*

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## SECTION III.

## BLASTING MATERIALS.

**MIXED GUNPOWDERS.**—In the year 1817 it was reported from Brazil that by mixing gunpowder with the meal of the satropia manihot a great saving in gunpowder had been obtained. Trials were made by Herr Thurnagel in the lead mine Fredrick, Tarnowitz, in upper Silesia, by mixing the powder with sawdust. In other places trials have been made with dust of lycopodium, and such like seeds, which seem to confirm the statement that a saving of 30 per cent. in the use of gunpowder was effected. In the above-mentioned mine the gunpowder was mixed with an equal quantity of sawdust, and for a period of two years and a half during which the trials were continued good results were obtained; but in other places the results have turned out very variable. In later experiments in the Fredrick lead mine, beside sawdust, horn and brass filings, bean, barley, buckwheat, oat and rye chaff were tried, but showed no increase in the strength of the powder, at least none could be attributed to the development of gas from the sawdust, since the mixture with horn filings ought to have given a greater effect than with brass filings. In any case it might be assumed that the sawdust caused a more regular combustion of the powder, and, therefore, a better effect. In the United States the employment of a mixture of gunpowder and burnt lime has been introduced; but the effect of the mixture, even when the lime amounts only to 1-12th, is less than that due to a mixture of powder and sawdust. It is a fact pretty well known to most mining agents that the miners are in the habit of using more powder than is necessary, a fact which will explain most of the cases of a saving of powder when mixed with other substances.

Davey, of the firm of Bickford, Smith, and Davey, Tuckermill, Cornwall, has proposed to replace part of the charcoal by meal, bran, starch, and similar substances, by which the danger in the preparation of the powder was to be obviated. The saltpetre is dissolved in water, so that by mixing with sulphur, charcoal, and meal (or starch, &c.), a thicker paste is formed, which is passed between a pair of rolls, or pressed through a sieve, by which means it is formed into a thin band, or long narrow strips: these are caught on an endless band of cloth, and passed slowly through the drying chamber, after which they are broken by passing through a pair of wooden rollers. The holes in the sieve are made proportional to the size of grain in which it is desired to obtain the powder. The powder has a dull appearance, and is said to effect a saving of 35 per cent. according to weight; besides being cheaper by weight than ordinary gunpowder, as less saltpetre is required, and the preparation requires less time.

There would seem to be no reason why the introduction of neutral substances should increase the effect of powder, but rather the contrary, although under certain circumstances the addition of such a body as sawdust may be advantageous, as preventing the powder from cohering in lumps, so that a more regular combustion takes place. But there remains still the disadvantage that deeper holes are required, and the tendency of the powder to hang fire is increased, as part of the sawdust may remain for some time in a glowing condition.

**LITHOPRACTEUR** (or white blasting powder, not that generally known in this country as lithopraeur, which is a nitro-glycerine compound, and which we shall describe further on) consists of a mixture of rough powdered saltpetre and sulphur, together with some other carbonaceous substance in place of charcoal (probably meal or bran, treated with nitric acid). It is difficult to ignite, and when placed in a train, and ignited at one end, burns but slowly, and may even go out before reaching the other end, so that when used it is necessary to employ a long quick match, which is stuck to a depth of 4 in. in the cartridge, to cause a more rapid ignition throughout the mass. This powder has been tried at the mines Centrum and Moresnet, near E-schweiler, where the trials proved successful, the powder forcing off the rock without shattering it greatly, or hurling it violently from its position. In Upper Silesia this powder has been used in hard rock with tolerably good results; but in faulty and broken rock, and in coal, the powder burnt with little effect. It would hence appear that it is only in a confined state, by which the pressure brought to bear on it by the development of the gas becomes very great, and the consequent sudden increase of heat, that the rapidity of the combustion becomes sufficiently great to cause useful effect.

Küp, of Mühlheim, introduced about 12 years ago a powder, a nearly black looking substance, which appears to differ but little in composition from ordinary gunpowder, but was said to possess the advantages—"not suddenly to explode, but to burn slowly, the effect being due to the expansion of the heated gases, and that it does not lose in effect on being moistened," and thus the danger during preparation, transport, storing, and use was lessened, if not obviated. The effect appears to be greater than that of ordinary powder in wide working faces, and where the rock is not very hard, as it has the advantage of not hurling away but simply loosening the stone, so that in the winning of large coal its use was specially recommended. This is what might be expected if the effect of the powder is chiefly due to the gradual expansion of the gases produced; such a property of the powder, however, entails, on the contrary, a less effect in narrow headings, and with a very hard compact stone, than that of ordinary gunpowder, and it misses fire often, so that as it burns more slowly there is more danger to the miner; besides, it possesses the property of cohering in lumps, especially after being damp, which causes its carrying in powder bags and its pouring into cartridges to be very inconvenient. This powder probably contains more sulphur than ordinary gunpowder, mixed with some earthy substance. It was prepared in three different sorts: the first, which was of light yellow colour, was sold at 1s. per pound, the second of a grey black colour at 51. per pound, and the third somewhat similar at 4½d. per pound. The high price of the first, and the bad smells of the gases produced on combustion of the third, probably due to sulphuretted hydrogen, have prevented them coming into any extensive use. The second sort, called "alkaloid," has been tried in nearly all the Prussian mining districts, without coming into extensive use.

G. A. Neumeyer, of Taucha, near Leipsic, introduced in 1365 a powder, which appears to be similar to that just described. It consists of 75 per cent. of saltpetre, 6.25 per cent. of sulphur, and 18.75 per cent. of charcoal, so that it contains 57 per cent. less of sulphur, and 55 per cent. more of charcoal than ordinary gunpowder. As might be expected from its containing less sulphur, the development of the gases are less rapid than in the case with ordinary gunpowder, so that whilst for some purposes—coal and salt mines—it use would appear advantageous, in other cases—as in metalliferous mines, shaft sinking, and quarrying, where a sudden force is desired—its effect appears doubtful. It is said to burn, but not to explode by access of air, and is not ignited by percussion or pressure, so that its carriage and storage are unattended with danger, and there is less residue and less smoke, which is lighter and more quickly carried away, and has no injurious influence on the miners. The smoke appears to be less oppressive than that from ordinary powder, but in consequence of its hygroscopic character it deteriorates in effect with long keeping, and in faulty and jointy ground is comparatively without effect. Trials made with this powder at the coal mine König, in upper Silesia, are reported to have given very good results. Later trials, however, do not appear to have confirmed any of its supposed advantages over ordinary powder, for whilst the experiments at the König Coal Mine, in upper Silesia, at

\* Being Notes on a Course of Lectures on Mining, delivered by Herr Berggrath, Dr. von Gumboldt, Director of the Royal Bergakademie, Clausthal, The Harz, North Germany.

the Mansfield Copper Mines, and at the Salt Mines of Stassfurt were not unfavourable to the economical results obtained at the limestone quarry at Rüdersdorf have not been satisfactory.

At the coal mines at Brandeis, in Prussia, a powder has been tried in which sugar has been used instead of charcoal. It is of a white yellow colour, with an appearance like flour. Its composition is 76 per cent. of saltpetre, 9.5 per cent. of sulphur, and 14.5 per cent. of sugar. When ignited it burns more slowly and gives off less smoke than ordinary powder, but leaves a larger residue.

**POWDERS NOT CONTAINING SULPHUR.**—As we have previously mentioned, sulphur is not an essential constituent of powder. Schultze, a German, has proposed a gunpowder which depends upon the principle before mentioned, that sulphur is not an essential constituent of gunpowder. This powder consists of a mixture of saltpetre, and instead of charcoal wood is used. The wood is first cut by machines into small pieces, similar to the grains of ordinary powder, and sorted by means of sieves, or otherwise, into different sizes, according to the purpose for which it is intended. It is then treated with acid, and an easily soluble salt, and afterwards treated with concentrated nitric and sulphuric acid. The grains are afterwards treated in a saturated solution of some nitric acid salt (Schultze prefers potassium or barium nitrate, or a mixture of both), dried, and separated from dust in a riddle. It is said to possess the great advantage over ordinary gunpowder that it can be moistened with water and afterwards dried, without losing in effect, and can be thus transported without danger, so that when it is obtained it only requires to be properly dried to be fit for use. It appears probable that this powder contains an excess of saltpetre, so that after being moistened, although part of the saltpetre may have been carried off in solution, there may still remain quite sufficient to cause complete combustion of the carbon. Besides, the carbon being in the form of wood would retain, like a sponge, better any moisture which might be condensed on it, and not allow it to drain off, carrying off the saltpetre. It is also nearly three times as light as ordinary gunpowder, but gives a much greater effect, and it is only necessary to fill the hole 1 or 2 in. higher in order to obtain the same result as with ordinary blasting powder, according to which 33 to 40 lbs. of Schultze's powder is as effective as 100 lbs. of the ordinary, so that the greater cost, of 1s. per pound, is fully compensated for. The products of combustion are less injurious to the miner, and very little solid residue is left, so that in mining operations, where the blackening of the mineral is a question of importance (as in salt and some metalliferous mines), it possesses considerable advantages. Yet the considerable advantages which this powder appears to possess, and the satisfactory results obtained with it, still it has not come into extensive use, because on several occasions unexpected explosions have occurred, with fatal results; although when not in a confined space it burns without detonation. It is possible that the treatment of the fibres of the wood with concentrated nitric acid forms a compound somewhat similar in composition and properties to gun-cotton. As the wood is also treated with sulphuric acid without any subsequent washing (which is Abel's essential improvement in the manufacture of gun-cotton), this may lead to a subsequent rapid oxidation, and consequent heating of part of the constituents of the powder, which may have been the cause of the above explosions, and, therefore, of its non-acceptance generally as a blasting material. The trials of this powder at the Mansfield copper mines gave very satisfactory economical results, but its use in the salt mines at Stassfurt, and at the limestone quarry near Rüdersdorf, appear to have been carried on at a loss. At other places in Germany it has been stated to exercise an injurious effect on the health of miners, the gases produced on combustion causing heaviness on the chest and sickness.

**HALOXYLIN** is the name given to a powder in which the sulphur is entirely absent, and in which charcoal is replaced by wood or other vegetable fibres. In properties it is very similar to the two above-mentioned powders—Neumeyer's and Kúp's—the gases developed on combustion being less in quantity and less injurious to the miners than ordinary gunpowder; it has a less useful effect in loose faulty ground than in firm rock, and possesses the disadvantage of being hygroscopic. It is said not to explode in the open air, but only to burn slowly, and is, therefore, less dangerous than ordinary gunpowder, but an unexplained explosion of the Haloxylin Factory of Anders and Fehleisen, near Winterberg, in Bohemia, has lessened public faith as to its inexpensive qualities. In the Prussian mines the economical results of trials with this powder do not appear to have been very satisfactory, so that it has not come into very extensive use on the Continent.

## ON NATIVE COPPER, SILVER, AND GOLD IN ABNORMAL CONDITIONS.\*

By T. A. READWIN, F.G.S., M.R.I.A., &c.

Attention has already been directed by me to some interesting recent changes from normal conditions of certain minerals, containing severally copper, silver, and gold, and I would now specially refer to 15 specimens worthy of particular notice. All the metallic changes upon them have taken place at what may be called ordinary temperatures under ordinary conditions, and the observed changes have been distinguished by me (wanting a better term) as "Metal Growth." Perhaps, it is hardly safe to say that a mineral under observation at any time is in a normal condition, for most analyses disclose the presence of substances thought to be foreign to the chemical composition of the respective minerals analysed. In short, it is not clear that we actually know the original, normal, or ordinary conditions of any mineral whatsoever.

We are accustomed to say that every solid inorganic body is either amorphous or crystalline, but on examination it will be seen that none of the metal-growths present are either crystalline or amorphous. They are really multimorphic, although several of them (like many others in my possession) have a general resemblance. It is observable that some of these palpably recent excretions have occurred before and others after the decomposition of a sulphide. Others, as far as surface appearances reveal, exuded wholly independently of sulphides, &c. A natural continuity of transference of mineral substances into vegetable matter in the production of new growths, forms, and shapes is a fact universally admitted; and I submit that it has yet to be shown whether there is not also a similar varied continuity in mineral metamorphoses, inasmuch as there are evident nearnesses of relationship between abnormal aborescent, plumose, and other metallic shapes, and some of the lower vegetal appearances.

It has been suggested as possible that one of the results of the visible decomposition of a compound may be the generation of a kind of "formation force" in one of the substances contained in it, somewhat analogous to "vital force." Some such force may really be, but assuming it to be, it will only partially explain the phenomena now exhibited. There will remain unexplained the distinctive metal growth from undecomposed or normal sulphides, and more extraordinarily still, those growths from what appears to be pure silica in a normal condition, unassociated, as far as is known, with any other metallic substance. By process of negation the cause or causes of these mineral alterations may be pushed somewhat into a corner for determination. For example, under the known circumstances of these changes the action of water cannot be said to have had any influence; of gaseous influence none can be imagined. There is a total absence of the usual observed effects of heat. Atmospheric influence is barely possible. Light, potential in plant movements, somehow may be a possible aid in mineral movements or growths. A latent electro-motive power is also possible. No acid appears to have been concerned, except that of silicic acid, in the solid condition of quartz, in some of the specimens.

This leads to the idea that sometimes such growths derive their accumulating or aggregating particles from metal contained in the quartz matrix in a fluid state of infinite rarity, and as yet imperfectly understood, if not altogether unknown. The last idea in possible connection with electro-motive power of some kind may ultimately be found amongst the causes of such abnormal mineral conditions as these about to be described.

\* Written by Mr. READWIN for the recent meeting of the British Association for the Advancement of Science.

Commencing with one of the many mention that one specimen commenced sending forth its copper ago. Since February, 1876, I have

of an inch, within the period of apex of the looped growth has a Silver growth is shown in two growths from Mexican silver sulphurous prolongations seen in the brightest being of most infrequent has curled off since Christmas, May 6 last. There have been five cimen in the same period. A interesting silver growth out of specimen affords a very interesting of argentine in calcite. Nephids is enclosed in a film, the vases in acid. And a fifth specimen of silver growth out of unassociated with silver sulphide obtained by me on June 6 last at recently been taken out of the hood. Since that date I have silver movements in the third of little silver movement in the silver excretions have appeared and numerous delicate and pure. The first and second of this series sulphide (Acanthite). The host first specimen has taken place in similar excretions in the second months.

With regard to gold growth, which show interesting recent a definitely, electron growths) of normal condition, associated with. Two other specimens show recent posed pyrites, associated with quartz other electron growth in quartz, other metallic mineral. A sixth resting recent electron growths chiefly since May 6 last. Perhaps the most interesting illustration One filament is 1-10th in. long, mention that I have also electrumispickel, marcasite, tetrahedrite, present mineral associations, can affinity" for silver, and quartz.

I select these illustrations of are commonly called abnormal which I think may be not inappreciable, I beg to say that I do not of uncommon occurrences, although part unobserved, owing, it may be substances took their present shape long anterior to the birth of life, for, brought the facts forward attention may be given to mine.

## MINING I

We have been favoured by Mr. Mines and Chief Inspector, with for 1876. The Minister of Mines that the non-discovery of new past year and the want of water the extreme dryness of the seas the yield of alluvial gold, but it obtained from the deeper levels satisfactory yields. This should exploration of those neglected of gold at shallow levels. The mine owners, mine managers, assistance courteously given to to their books, and otherwise for the compilation of the returns. are included in the returns this tons 4 cwt., which is the large in any one year.

The reluctance displayed by the lication of the results of their longer exists, or exists but in is in the returns of quartz, quartz treated now approaches so near raised from quartz reefs as to a accuracy of the several estimates that they are very nearly correct, checking the estimated yield of few of the mineowners in this the amount of washdirt and cent. The estimates for 1876 show that 100,000 ozs. than the quantity repairs, moreover, that during the gold obtained from the alluvial that the yield of last year is less 1868. The general decrease is exhaustion of the gold in the district and to the non-discovery of new ance to compensate for the reduction yield of gold from the 585,575 ozs., the minimum in 1872. Although the average, than during the preceding five years the past 15 years, it is about equal quantity of pyrites and blanchet is a little less than the quantity yield of gold per ton is about the in the South-west district alone, not represented in this return.

The mining district giving the ton is Gipsland, and the next is crushed in these districts as common larat districts is relatively small, or sluiced during the year 1876, certain companies and individuals the yield of gold from which was average of 22.67 grs. per ton. Aspecting the crushing of 35,991 yielded 8171 ozs. 15 dwts. 4 grs. 13.14 grs. per ton. The number 1876, was—alluvial miners, 26,554,010. The number of alluvial number now employed is about since the same year the number of has also diminished by over 2000 of mining in 1876 as compared were 14,158 Chinese engaged in there were but 11,167. The number annually since the year 1876. Although the Chinese miners do in other industrial pursuits, like remarkable coincidences that they exactly in the same relative proportion gold exported and received in number of miners employed in the per man per annum.

During the past five years the in alluvial mining has decreased in quartz mining has increased by engines was employed in quartz in any preceding year. The esti-



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## SECTION III.

## BLASTING MATERIALS.

**MIXED GUNPOWDERS.**—In the year 1817 it was reported from Brazil that by mixing gunpowder with the meal of the satchapa manihot a great saving in gunpowder had been obtained. Trials were made by Herr Thurnagel in the lead mine Fredrick, Tarnowitz, in upper Silesia, by mixing the powder with sawdust. In other places trials have been made with dust of lycopodium, and such like seeds, which seem to confirm the statement that a saving of 30 per cent. in the use of gunpowder was effected. In the above-mentioned mine the gunpowder was mixed with an equal quantity of sawdust, and for a period of two years and a half during which the trials were continued good results were obtained; but in other places the results have turned out very variable. In later experiments in the Fredrick lead mine, beside sawdust, horn and brass filings, bean, barley, buckwheat, oat and rye chaff were tried, but showed no increase in the strength of the powder, at least none could be attributed to the development of gas from the sawdust. The mixture with horn filings ought to have given a greater effect than with brass filings. In any case it might be assumed that the sawdust caused a more regular combustion of the powder, and, therefore, a better effect. In the United States the employment of a mixture of gunpowder and burnt lime has been introduced; but the effect of the mixture, even when the lime amounts only to 1-12th, is less than that due to a mixture of powder and sawdust. It is a fact pretty well known to most mining agents that the miners are in the habit of using more powder than is necessary, a fact which will explain most of the cases of a saving of powder when mixed with other substances.

Davey, of the firm of Bickford, Smith, and Davey, Tuckermill, Cornwall, has proposed to replace part of the charcoal by meal, bran, starch, and similar substances, by which the danger in the preparation of the powder was to be obviated. The saltpetre is dissolved in water, so that by mixing with sulphur, charcoal, and meal (or starch, &c.), a thicker paste is formed, which is passed between a pair of rolls, or pressed through a sieve, by which means it is formed into a thin band, or long narrow strips: these are caught on an endless band of cloth, and passed slowly through the drying chamber, after which they are broken by passing through a pair of wooden rollers. The holes in the sieve are made proportional to the size of grain in which it is desired to obtain the powder. The powder has a dull appearance, and is said to effect a saving of 35 per cent. according to weight; besides being cheaper by weight than ordinary gunpowder, as less saltpetre is required, and the preparation requires less time.

There would seem to be no reason why the introduction of neutral substances should increase the effect of powder, but rather the contrary, although under certain circumstances the addition of such a body as sawdust may be advantageous, as preventing the powder from cohering in lumps, so that a more regular combustion takes place. But there remains still the disadvantage that deeper holes are required, and the tendency of the powder to hang fire is increased, as part of the sawdust may remain for some time in a glowing condition.

**LITHOFRACTEUR** (or white blasting powder, not that generally known in this country as litho-fracteur, which is a nitro-glycerine compound, and which we shall describe further on) consists of a mixture of rough powdered saltpetre and sulphur, together with some other carbonaceous substance in place of charcoal (probably meal or bran, treated with nitric acid). It is difficult to ignite, and when placed in a train, and ignited at one end, burns but slowly, and may even go out before reaching the other end, so that when used it is necessary to employ a long quick match, which is stuck to a depth of 4 in. in the cartridge, to cause a more rapid ignition throughout the mass. This powder has been tried at the mines Centrum and Moersner, near E-chweiler, where the trials proved successful, the powder forcing off the rock without shattering it greatly, or hurling it violently from its position. In Upper Silesia this powder has been used in hard rock with tolerably good results; but in faulty and broken rock, and in coal, the powder burnt with little effect. It would hence appear that it is only in a confined state, by which the pressure brought to bear on it by the development of the gas becomes very great, and the consequent sudden increase of heat, that the rapidity of the combustion becomes sufficiently great to cause useful effect.

Klip, of Mülheim, introduced about 12 years ago a powder, a nearly black looking substance, which appears to differ but little in composition from ordinary gunpowder, but was said to possess the advantages—"not suddenly to explode, but to burn slowly, the effect being due to the expansion of the heated gases, and that it does not lose in effect on being moistened," and thus the danger during preparation, transport, storing, and use was lessened, if not obviated. The effect appears to be greater than that of ordinary powder in wide working faces, and where the rock is not very hard, as it has the advantage of not hurling away but simply loosening the stone, so that in the winning of large coal its use was specially recommended. This is what might be expected if the effect of the powder is chiefly due to the gradual expansion of the gases produced; such a property of the powder, however, entails, on the contrary, a less effect in narrow headings, and with a very hard compact stone, than that of ordinary gunpowder, and it misses fire often, so that as it burns more slowly there is more danger to the miner; besides, it possesses the property of cohering in lumps, especially after being damp, which causes its carrying in powder bags and its pouring into cartridges to be very inconvenient. This powder probably contains more sulphur than ordinary gunpowder, mixed with some earthy substance. It was prepared in three different sorts: the first, which was of light yellow colour, was sold at 1s. per pound, the second of a grey black colour at 5s. per pound, and the third somewhat similar at 4s. per pound. The high price of the first, and the bad smells of the gases produced on combustion of the third, probably due to sulphuretted hydrogen, have prevented them coming into any extensive use. The second sort, called "alkaloid," has been tried in nearly all the Prussian mining districts, without coming into extensive use.

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**POWDERS NOT CONTAINING SULPHUR.**—As we have previously mentioned, sulphur is not an essential constituent of powder. Schultze, a German, has proposed a gunpowder which depends upon the principle before mentioned, that sulphur is not an essential constituent of gunpowder. This powder consists of a mixture of saltpetre, and instead of charcoal wood is used. The wood is first cut by machines into small pieces, similar to the grains of ordinary powder, and sorted by means of sieves, or otherwise, into different sizes, according to the purpose for which it is intended. It is then treated with acid, and an easily soluble salt, and afterwards treated with concentrated nitric and sulphuric acid. The grains are afterwards treated in a saturated solution of some nitric acid salt (Schultze prefers potassium or barium nitrate, or a mixture of both), dried, and separated from dust in a riddle. It is said to possess the great advantage over ordinary gunpowder that it can be moistened with water and afterwards dried, without losing in effect, and can be thus transported without danger, so that when it is obtained it only requires to be properly dried to be fit for use. It appears probable that this powder contains an excess of saltpetre, so that after being moistened, although part of the saltpetre may have been carried off in solution, there may still remain quite sufficient to cause complete combustion of the carbon. Besides, the carbon being in the form of wood would retain, like a sponge, better any moisture which might be condensed on it, and not allow it to drain off, carrying off the saltpetre. It is also nearly three times as light as ordinary gunpowder, but gives a much greater effect, and it is only necessary to fill the hole 1 or 2 in. higher in order to obtain the same result as with ordinary blasting powder, according to which 33 to 40 lbs. of Schultze's powder is as effective as 100 lbs. of the ordinary, so that the greater cost, of 1s. per pound, is fully compensated for. The products of combustion are less injurious to the miner, and very little solid residue is left, so that in mining operations, where the blackening of the mineral is a question of importance (as in salt and some metalliferous mines), it possesses considerable advantages. Yet the considerable advantages which this powder appears to possess, and the satisfactory results obtained with it, still it has not come into extensive use, because on several occasions unexpected explosions have occurred, with fatal results; although when not in a confined space it burns without detonation. It is possible that the treatment of the fibres of the wood with concentrated nitric acid forms a compound somewhat similar in composition and properties to gun-cotton. As the wood is also treated with sulphuric acid without any subsequent washing (which is Abel's essential improvement in the manufacture of gun-cotton), this may lead to a subsequent rapid oxidation, and consequent heating of part of the constituents of the powder, which may have been the cause of the above explosions, and, therefore, of its non-acceptance generally as a blasting material. The trials of this powder at the Mansfield copper mines gave very satisfactory economical results, but its use in the salt mines at Stassfurt, and at the limestone quarry near Radersdorf, appear to have been carried on at a loss. At other places in Germany it has been stated to exercise an injurious effect on the health of miners, the gases produced on combustion causing heaviness on the chest and sickness.

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By T. A. READWIN, F.G.S., M.R.I.A., &amp;c.

Attention has already been directed by me to some interesting recent changes from normal conditions of certain minerals, containing severally copper, silver, and gold, and I would now specially refer to 15 specimens worthy of particular notice. All the metallic changes upon them have taken place at what may be called ordinary temperatures under ordinary conditions, and the observed changes have been distinguished by me (wanting a better term) as "Metal Growth." Perhaps, it is hardly safe to say that a mineral under observation at any time is in a normal condition, for most analyses disclose the presence of substances thought to be foreign to the chemical composition of the respective minerals analysed. In short, it is not clear that we actually know the original, normal, or ordinary conditions of any mineral whatsoever.

We are accustomed to say that every solid inorganic body is either amorphous or crystalline, but on examination it will be seen that none of the metal-growths present are either crystalline or amorphous. They are really multifarious, although several of them (if many others in my possession) have a general resemblance. It is observable that some of these palpably recent excretions have occurred before and others after the decomposition of a sulphide. Others, as far as surface appearances reveal, exuded wholly independently of sulphides, &c. A natural continuity of transference of mineral substances into vegetable matter in the production of new growths, forms, and shapes is a fact universally admitted; and I submit that it has yet to be shown whether there is not also a similar varied continuity in mineral metamorphoses, inasmuch as there are evident nearnesses of relationship between abnormal aborescent, plumose, and other metallic shapes, and some of the lower vegetal appearances.

It has been suggested as possible that some of the results of the visible decomposition of a compound may be the generation of a kind of "formation force" in one of the substances contained in it, somewhat analogous to "vital force." Some such force may really be, but assuming it to be, it will only partially explain the phenomena now exhibited. There will remain unexplained the distinctive metal growth from undecomposed or normal sulphides, and more extraordinarily still, those growths from what appears to be pure silica in a normal condition, unassociated, as far as is known, with any other metallic substance. By process of negation the cause or causes of these mineral alterations may be pushed somewhat into a corner for determination. For example, under the known circumstances of these changes the action of water cannot be said to have had any influence; of gaseous influence none can be imagined. There is a total absence of the usual observed effects of heat. Atmospheric influence is barely possible. Light, potential in plant movements, somehow may be a possible aid in mineral movements or growths. A latent electro-motive power is also possible. No acid appears to have been concerned, except that of silicic acid, in the solid condition of quartz, in some of the specimens.

This leads to the idea that sometimes such growths derive their accumulating or aggregating particles from metal contained in the quartz matrix in a fluid state of infinite rarity, and as yet imperfectly understood, if not altogether unknown. The last idea in possible connection with electro-motive power of some kind may ultimately be found amongst the causes of such abnormal mineral conditions as these about to be described.

\* Written by Mr. READWIN for the recent meeting of the British Association for the Advancement of Science.

Commencing with one of the abnormal conditions of copper, may mention that one specimen, a cherry-quartz fragment, commenced sending forth its copper excretions less than three years ago. Since February, 1876, I have noticed a growth of 1-10th of an inch, within the period of three weeks. The movement at apex of the looped growth has sensibly increased since April 17th.

Silver growth is shown in two specimens; these are recent siliceous prolongations seen in the first of these are all of recent date, the brightest being of most infantine growth. All the silver has curled off since Christmas, and most of it has resulted in a specimen in the same period. A third specimen exhibits an interesting silver growth out of argenteite in calcite. A fourth specimen affords a very interesting illustration of silver growth out of argenteite in calcite. Nearly the whole of the silver growth is enclosed in a film, the materials of which will not dissolve in acid. And a fifth specimen is an extremely interesting unassociated with silver sulphide. The last three specimens were obtained by me on June 6 last at Kongsberg, in Norway, and have recently been taken out of the ancient silver mine in the neighbourhood. Since that date I have detected a few new splinter-like silver movements in the third of these specimens, and only one little silver movement in the fifth; but in the fourth two new silver excretions have appeared from the film-covered argenteite and numerous delicate and purely argenteite growths in the calcite. The first and second of this series of specimens are Freiberg sulphide (Acanthite). The horse-nail like coil movement in first specimen has taken place whilst in my possession, and the similar excretions in the second specimen within the last few months.

With regard to gold growth, I will first refer to two specimens which show interesting recent argenteous gold growths (or, definitely, electrum growths) out of iron sulphide (pyrites) in normal condition, associated with quartz. [M-tal = 80 Au 20]. Two other specimens show recent electrum growths out of decomposed pyrites, associated with quartz. A fifth specimen shows other electrum growth in quartz (apparently unassociated with other metallic mineral). A sixth specimen shows extremely interesting recent electrum growths in an indexed quartz cavity, resting chiefly since May 6 last. And a seventh specimen shows the most interesting illustrations of recent electrum growth. One filament is 1-10th in. longer than it was on May 6 last. I mention that I have also electrum growths out of galena, blende, mispickel, marcasite, tetrahedrite, tetralymite, and barytes. In present mineral associations, calcite appears to have a "super-affinity" for silver, and quartz for gold.

I select these illustrations from a considerable number of which are commonly called abnormal conditions of native metals, which I think may be not inaptly called metal growths. In conclusion, I beg to say that I do not think such facts as these are of uncommon occurrence, although they may have been for the part unobserved, owing, it may be, to the popular idea that mineral substances took their present shapes and forms in time periods long anterior to the birth of living mineralogists. I have, therefore, brought the facts forward in the hope that in the future attention may be given to mineral changes in their relations to

## MINING IN VICTORIA.

We have been favoured by Mr. Thomas Couchman, Secretary Mines and Chief Inspector, with the Mineral Statistics and Report for 1876. The Minister of Mines—Mr. William McLellan—remarks that the non-discovery of new areas of auriferous drift during past year and the want of water for sluicing operations, caused the extreme dryness of the season, have operated prejudicially to the yield of alluvial gold, but it is gratifying to find that the obtained from the deeper levels of the vein mines continues to satisfy the requirements. This should act as an incentive to the exploration of those neglected mines which gave satisfactory results of gold at shallow levels. The Department is again indebted to mine owners, mine managers, managers of banks, and others assistance courteously given to its officers by granting them access to their books, and otherwise furnishing information required for the compilation of the returns. Over one million tons of gold are included in the returns this year—the exact quantity is 1,011 tons 4 cwt.—which is the largest quantity of quartz yet returned in any one year.

The reluctance displayed by mineowners in years past to the publication of the results of their crushing operations either no longer exists, or exists but in isolated cases. The total yield of the returns of quartz, quartz tailings, and pyrites crushed, treated now approaches so nearly to the estimated amount of gold raised from quartz reefs as to afford very satisfactory proof of accuracy of the several estimates, and there can be but little doubt that they are very nearly correct. There are no such means checking the estimated yield of alluvial gold, in consequence of the few of the mineowners in this branch of mining keeping records of the amount of wash-dirt and cement passed through the machinery. The estimates for 1876 show that the yield of gold was less than 100,000 ozs. than the quantity raised in the preceding year. It appears, moreover, that during the past nine years the quantity of gold obtained from the alluvial deposits has fallen off annually, so that the yield of last year is less by two-thirds than the yield of 1863. The general decrease is due to the gradual and inevitable exhaustion of the gold in the drifts of the first discovered gold fields, and to the non-discovery of new mining areas of sufficient importance to compensate for the reduced yields of the older fields. The yield of gold from quartz mines has fluctuated between 585,575 ozs., the minimum in 1870, and 691,826 ozs., the maximum in 1872. Although the average yield of gold per ton was less than during the preceding five years, the statistics show that, in the past 15 years, it is about equal to the mean for that period. The quantity of pyrites and blanketing operated on during the past year is a little less than the quantity treated during 1875; the yield of gold per ton is about the same. Over 6000 tons were treated in the Sandhurst district alone. Ararat is the only mining district not represented in this return.

The mining district giving the highest average return of gold is the Gipsland, and the next is Ararat, but the quantity of quartz crushed in these districts as compared with the Sandhurst and Ararat districts is relatively small. The quantity of wash-dirt passed or sluiced during the year 1876, according to the returns made by certain companies and individual miners, was 574,164 tons 2 cwt. of the yield of gold from which was 27,116 ozs. 13 dwts. 22 grs., or an average of 22.67 grs. per ton. Information has been obtained respecting the crushing of 35,938 tons 7 cwt. of cement, which yielded 8171 ozs. 15 dwts. 4 grs. of gold, or an average of 4 dwts. 13.14 grs. per ton. The number of persons employed on Dec. 31, 1876, was—alluvial miners, 26,538; quartz miners, 14,452; total, 41,010. The number of alluvial miners is still decreasing. The number now employed is about 10,000 less than in the year 1875, the same year the number of miners employed in quartz mines has also diminished by over 2000, but the decrease in both classes of mining in 1876 as compared with 1875 is only 707. In 1874 there were 14,158 Chinese engaged in mining pursuits, whilst in 1876 there were but 11,167. The Chinese miners have decreased in number annually since the year 1871, when they amounted to 24,000. Although the Chinese miners do not in this colony become as much engaged in other industrial pursuits, like the European miners, it is a remarkable coincidence that their decrease in number is exactly in the same relative proportion. Dividing the value of the gold exported and received into the Mint amongst the number of miners employed in the year 1876 the average is 89L 19s. 6d. per man per annum.

During the past five years the number of steam-engines employed in alluvial mining has decreased by 90, and the number employed in quartz mining has increased by 10. A greater number of steam-engines was employed in quartz mining during the last year than in any preceding year. The estimates of the value of the machinery

\* Being Notes on a Course of Lectures on Mining, delivered by Herr Berggrath, Dr. von Gumbach, Director of the Royal Bergakademie, Clausthal, The Harz, North Germany.







**PARRACOMBE MINES.**—There is evidently a disposition to attract more attention to North Devonshire lead mines, and a new one is about to be introduced under this title. It is a silver-lead mine, about four miles east of the Combmartin Mines, and very favorably reported on. The sett is very extensive, with a good supply of water. Adit levels can be driven on the course of the lode. The lode dips



1877

Sept. 8, 1877.

one of which has been opened on, and about 10 ft. from the top of the ore. The produce assayed was 15½ in 20 for lead, and 10 in 20 for silver.

**BIRMINGHAM BOLT AND NUT COMPANY (Limited).**—A first dividend of 10 per cent. per annum from the profits of the company has been declared by the directors of this company. The company has been declared by the directors of this company. The company has been declared by the directors of this company.

**THE AMERICAN BLACKMAILERS, CHAFFES AND CO.**—The directors of this company have declared a dividend of 10 per cent. per annum from the profits of the company. The company has been declared by the directors of this company. The company has been declared by the directors of this company.

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their ordinary shares, or more than 25. for their preference shares.—Mr. IAGO DANIEL (Pontypridd) maintained that they could raise 500 tons a day from the 4-foot seam, instead of 250 tons.—Capt. DALE asked why coal had not been worked to a fuller extent?

Mr. BROWN: If you can find a market, we can raise it. This is a new colliery, and you have to go into the market and try to obtain a connection. I think you will find that there is not much to complain of in the rate at which markets have been found. Yesterday we raised over 500 tons a day.—Mr. REES said he understood the coal was not now sold in Cardiff, but in London.—Mr. INSKIP observed that Mr. Brown's statement differed from Mr. Bryant's statement.

After further discussion, the CHAIRMAN said the directors would be happy to meet a committee of shareholders, and confer with them, but the report should be adopted.—Mr. JEFFERY refused to sanction the adoption of the report. Ultimately it was agreed that the accounts should be received, that the meeting be adjourned to Sept. 27, and that before deciding upon the adoption of the report a committee, consisting of the following gentlemen—confer with the directors:—Messrs. Jeffery (Leeds), Briscoe, Lees, Inskip, Spencer (Cardiff), J. E. Price, and Christopher James.—The proceedings then terminated.

**SOUTH TOLCARN.**—At a general meeting of shareholders, held at the offices of the company, on Thursday (Mr. C. Clark in the chair), the financial statement for 16 weeks, after charging costs to July, showed a balance in favour of the mine of 229. 10s. 10d. A call of 4s. per share was made. The committee of management were re-elected, and a vote of thanks given to the Chairman.

**VAN RAILWAY.**—The half-yearly meeting of shareholders was held at the board room of the Van Mines, on Aug. 28, when the chair was taken by Mr. W. Page; the vice-Chairman (Mr. A. R. Boughton-Knight) leaving after the directors' meeting with Captain Crewe-Rear, R.N. Among these present were Messrs. John Allington, F. Hunt, Robert Oldrey, Wade-Grey, W. J. Lavington (secretary), and W. N. Swettenham (engineer). After some frivolous objections by Mr. Evan Powell, one of the engineers and an auditor of the company, a resolution to issue 3000l. 6 per cent. perpetual debenture stock was confirmed; a dividend of 7½ per cent. was declared; the retiring directors were re-elected, and Mr. F. Hunt appointed an auditor in the place of Mr. Powell. It was also moved that 100l. per annum from the time 5 per cent. had been declared be paid to the directors who had previously acted without remuneration.

## DEEP MINING SHAFTS IN EUROPE.

Twenty years ago the deepest mining shafts in the world reached only about 2000 ft. below the surface. The very deepest, we believe, was a metalliferous mine in Hanover, which has been carried down to the depth of 2290 ft. The deepest perpendicular shaft to-day is the Adalbert shaft in a silver-lead mine in Prizibram, in Bohemia, which has reached a depth of 3280 ft. The attainment of that depth was made the occasion of a three days festival, and still further noticed by the striking off of a large number of commemorative silver medals of the value of a florin each. There is no record of the beginning of work on this mine, although its written history goes back to 1527. Quite recently an elegant commemorative volume has been written and printed, which is most interesting to those who have a taste for either the actualities or antiquities of mining industry. There are two other localities, however, where a greater depth has been reached than at the Adalbert shaft, but not in a perpendicular line. These are—1. The Rocksalt bore hole, near Sporenberg, not far from Berlin, which a few years ago had been bored to a depth of 4175 ft.—2. The coal mine of Viviers Remus, in Belgium, where the miners, by shaft sinking together with boring, have reached a total depth of 3542 ft. Turning from these two mines, no shaft in unbroken perpendicular line has as yet exceeded the depth of 3280 ft. Taking each singly, the deepest shafts in the world at the present moment group themselves according to the following order:—

1.—The already-mentioned Adalbert shaft, 3280 ft. deep. As the top of this shaft is 1732 ft. above the sea level the bottom is, of course, 1548 ft. below it.

2.—Two shafts near Gilly, in Belgium, are sunk to the depth of 2847 ft. At this depth they were both connected by a horizontal drift, from there an exploring shaft is sunk to a further depth of 666 ft., and from there again a trial hole, 49 ft. in depth, is put down, so that the total depth reached is 3542 ft. As they did not in the bore-hole discover the sought-for coal seam, they have returned to the shaft at the 2847-ft. level.

3.—The Eimkerts shaft of the Lugaer Coal Mining Company, Rhenania, Lugaer, in the kingdom of Saxony, is 2653 ft. deep.

4.—The Sampson shaft of the Oberhartz Lead and Silver Mining Works, near St. Andreasberg, Hanover, has a depth of 2437 ft., is at present the deepest shaft of Prussian mining.

5.—The winding shaft of the Rosebridge Colliery, near Wigan, Lancashire, England, has a depth of 2455 ft. Coal is drawn from the "hanging on" at the 2418 ft. level; the time of the cage running this distance being 55 seconds; the winding rope has, therefore, an average speed of 44 ft. per second.

6.—A shaft at the coal mines of St. Luke, near St. Chaumont, in the Loire department, France, reaches 2253 ft.

7.—The shaft of the Dunkirk Colliery, near Dunkinfield, Lancashire, is 2069 ft. deep, but the mining is prosecuted to a further depth of 755 ft. by shafts from the lower levels, making a total depth of the mine of 2824 ft.

8.—The deepest shaft of the collieries near Ronchamp, in France, is 1881 ft. A similar depth has been reached by the argentiferous mine near Kongsberg, in Norway. The mines belonging to the Roros Copper Works, in Norway, have worked to the depth of from 2540 ft. to 4270 ft.

9.—The Amalia shaft in the mine works near Schemnitz, in Hungary, 1782 ft.

10.—The No. 1 Camphausen shaft, near Fishbach, in the department of the Saarbrück Collieries, has now reached the depth of 1650 ft., and may possibly become the deepest shaft in Prussian coal mining.

Although the depths to which the shafts enumerated have penetrated into the interior of the earth in the art and practice of mining may appear mighty, and may be an expressive witness of the great progress made in mining pursuits, yet, on the other hand, the above results may be considered insignificantly small when we compare them with the extent of the earth's crust and the diameter of the earth. The deepest bore-hole in the world is the artesian spring at Potsdam, in Missouri, which reaches a depth of 5500 ft.

The following Reports were received too late for insertion in their proper place:—**GLENNY.**—R. Rowe, Sept. 7: Telegram: The shaft sunk over 5 fms. below the 60; lode 6 ft. wide, spar and blende forming on footwall face. The 50th is improving, and must be continued, ore dipping south under the level, from the present appearance not driven on this part of the lode. The 40 yielding lead and blende to pay.

**SOUTH TOLCARN.**—W. Rich, W. Hambly, Sept. 4: The 50, east of engine-shaft, is extended 45 fms. on Fraser's lode; 90 has also made communication between this level and the 40, on the course of the lode, thereby proving the drivage at the 50 to have been made on the same lode as the 40. A good lode of tin was reported to have gone down in the bottom of the 40, and doubts were expressed that Fraser's lode had not been intersected in the 50, but it is now proved beyond a doubt that Fraser's lode has been operated on at the deeper level, and the lode has yielded occasionally good stones of copper, it is too poor to pay for working. We have also put a speculative cross cut north some 18 fms. at the 50; if a good discovery is not made quickly we should advise that this part of the mine be abandoned and the pitwork drained to surface. We would here remark that the engine shaft is away from South Condurow boundary some 250 fms. We have the engine shaft in a very promising appearance, and is of good average width, and carries floor-spar, and good stones of copper. We would advise that operations be continued on this lode. There has been extra cost incurred since your last general meeting in materials and labour in draining the copper lode. We have also been working at the engine-shaft and towards the eastern boundary three different points at once. We have sampled a parcel of copper from the back and bottom of the adit, but this is of very low quality. Any sales we may make in future will be of much higher quality. If the works are confined to the north copper lode, and to opening on the tin lode near the boundary of South Condurow.

**VALE OF CONWAY.**—Sept. 7: East and West Lode: The ground here continues very hard, but the lode holds good, with 1 ton of lead per fathom. The slope in the bottom of the old mine is improving as we are getting nearer the old

shaft, producing saving work. We have made and fixed about half of the length of launders from the river to the water-wheel.

## PRODUCTION OF METALS AND METALLIC ALLOYS.

Some further improvements upon his several inventions connected with the production of metallic alloys have been patented by Mr. JOHN HOLLWAY, of Jeffrey's-square. One of the former inventions was for the manufacture of spiegeleisen or ferro-manganese; another for the utilisation of blue billy; and the present relates to the production of other metalliferous compounds, by a similar process. There appears to be very little in the invention so far as can be discovered from the specifications, which seem to have been drawn up by the inventor himself, and with insufficient knowledge of what such documents are intended to be—a description of an invention, and not an undigested mass of laboratory notes and memoranda. It appears that one object of the invention is the formation of a compound metallic coke, containing oxide of chromium and oxide of iron, which coke when smelted will produce ferro-chromium or chromeisen. Another object is the formation of a compound metallic coke containing, in addition to oxides of iron and chromium, substances containing manganese, for the production of an alloy of chromium, magnesium, and iron. These will serve as examples for other alloys, which he intends to produce more easily than heretofore.

It is very difficult, he thinks, if not impossible, to reduce chrome iron ores in the ordinary blast-furnace, or by the ordinary methods; he, therefore, proposes to take chrome iron ore, adding thereto iron ore, if desired, with the fluxes necessary, together with sufficient coal or other carbonaceous materials, and bitumen, if necessary, to make a sound coke, pulverise or disintegrate and wash the ingredients that require to be so treated, and well mix the whole. The mixture when coked and smelted alone or with suitable metalliferous substances, and with or without ordinary coke, will be capable of yielding ferro-chromium or chromeisen. To produce an alloy of chromium, magnesium, and iron he takes substances containing manganese, chromium, and iron with the necessary fluxes if desired, together with sufficient coal, adding bitumen if necessary to make a sound coke, pulverise or disintegrate and wash each of the ingredients as require to be so treated, and well mix the whole. The mixture when coked and smelted alone, or with suitable metalliferous substances, and with or without ordinary coke, will yield an alloy of chromium, magnesium, and iron.

The ingredients are to be varied according to the different characters and analyses of the metalliferous substances to be smelted with the metallic coke. Mr. Hollway considers that the cause of failure of similar efforts in the same direction has arisen from the attempt to get too much metal into the lumps prepared for smelting. He also remarks that the ingredients being in a pulverulent state, objectionable constituents can be more easily removed by washing or other purifying processes—for example, ores containing phosphorus, after being pulverised, can be washed to get rid of the fossil remains which are found in aqueous iron ore deposits, and these as well as other iron ores can, if desired, be treated with sulphuric acid or other acids for the purpose of further reducing the percentage of phosphorus, thus rendering it suitable for the manufacture of the better qualities of iron and steel. This pulverulent condition of metalliferous substances has heretofore been considered a mechanical difficulty; in order to overcome this many processes have been devised; in his process, however, this condition is an advantage, if not even a necessity. When non-coking coal or other carbonaceous material is used, or metalliferous substances which are reducible at a temperature which renders coking only partially or altogether unnecessary, it will be advisable to mix the ingredients together, in a heated state preferred, and form them into blocks by pressure, taking care to use sufficient binding materials, particularly bitumen, in order that the blocks may hold together. These blocks may be baked and partially or wholly coked before introduction into the furnace, and if not wholly coked the coking and smelting will be completed in the furnace.

**PETROLEUM V. GAS.**—The Romford Board of Health have taken definite steps to substitute petroleum for gas in the public streets by accepting at their last meeting the tender of Mr. Deitz to alter the public lamps according to his patent for burning oil, and at the same meeting they accepted the tender of Mr. E. Pertwee, a local purveyor, to supply oil for the lamps (white petroleum, 120°), at 1s. 2d. per gallon. There were six tenders presented, including those of the American Oil Light Company, and the Crown Lubricating Oil Company, and several other London firms. It was stated that the clerk has received applications from no less than 20 Town Councils and Local Boards for information as to the cost and modus operandi of substituting oil for gas in the public streets.

LEAD ORES.			
Date.	Mines.	Tons.	Price per ton.
Sept. 6—	Ladywell	20	£11 0 6
—	Rookhope	40	11 11 6

COPPER ORES.			
Date.	Mine.	Tons.	Price per ton.
Sept. 6—	Parya Mountain	220	£1 1 0

COPPER ORES.					
Sampled Aug. 22, and sold at Tabb's Hotel, Redruth, Sept. 6.					
Mines.			Mines.		
	Tons.	Price.		Tons.	Price.
Mellanear	78	£2 2 6	East Pool	29	£2 17 0
ditto	77	2 10 0	ditto	15	4 9 0
ditto	73	2 19 0	ditto	68	2 4 0
ditto	59	3 2 6	South Crofty	68	2 6 0
ditto	52	2 13 6	ditto	55	1 16 6
ditto	51	2 12 6	Levant	59	6 0 6
ditto	50	8 11 6	ditto	54	6 15 0
West Tolgus	76	6 14 6	ditto	49	6 0 6
ditto	72	3 19 0	ditto	2	28 0 0
ditto	65	7 13 0	Carn Brea	28	2 18 0
ditto	59	4 4 6	ditto	26	1 13 0
ditto	50	7 6 6	ditto	24	2 0 0
ditto	40	7 4 6	Killifreth	42	5 5 0
ditto	39	4 11 6	ditto	35	5 3 0
West Seton	51	4 2 0	West Basset	41	3 16 0
ditto	51	4 1 6	North Trekerby	37	3 17 0
ditto	50	4 1 0	South Condurow	19	7 3 6
ditto	45	3 7 6	Poldice	16	1 10 0
ditto	45	4 16 6	ditto	2	5 10 6
ditto	38	4 11 0	South Tolcarn	16	4 2 6
ditto	15	2 2 0	Delcoath	17	10 0 0
East Pool	57	2 15 0	Wheal Uny	8	2 8 0
ditto	47	2 13 6	Sedgman's Ore	2	0 10 0
ditto	36	2 12 0			

TOTAL PRODUCE.					
Mellanear.....	440	£1461 12 6	West Basset.....	41	£ 156 1
West Tolgus.....	401	2275 14 0	North Trekerby.....	37	142
West Seton.....	338	1319 19 0	South Condurow.....	19	136
East Pool.....	207	561 18 6	Poldice.....	17	8
South Crofty.....	180	381 5 6	South Tolcarn.....	17	8 1
Levant.....	160	1056 11 6	Delcoath.....	16	66
Carn Brea.....	78	174 10 0	Wheal Uny.....	8	19
Killifreth.....	77	400 15 0	Sedgman's Ore.....	2	1

Average standard	£ 86 18 0	Average produce	7%
Average price per ton	227	Quantity of fine copper 150 tons 13 cwt.	
Quantity of ore	48297 11 0	Amount of money	£8297 11 0

LAST SALE.—Average standard	£ 96 16 0	Average produce	0
Standard of corresponding sale last month	£ 90 14 0	Produce	8

COMPANIES BY WHOM THE ORES WERE PURCHASED.			
Names.	Tons.	Amount.	
Vivian and Sons	352½	£2054 9 0	
Grenfell and Sons	381	1510 18 0	
Wheal, Druce, and Co.	381	1448 2 0	
Williams, Foster, and Co.	382½	1290 3 0	
Mason and Elkington	184	547 18 0	
Charles J. Lambert	370	1436 1 0	
Total	2027	£8297 11 0	

NO SALE on Thursday next, September 13.

Copper ores for sale at the Royal Hotel, Truro, on Thursday week—Mines and parcels.—Devon Great Consols 1023—South Crofty 197—Glasgow Caradon 195—Bedford United 122—Wheal Courtney 76—East Caradon 70—Prince of Wales 67—Belstone 36—Wheal Russell 30.—Total, 2280 tons.







that an arrangement will shortly be effected by which this debt will be discharged, so that the amount so received may be distributed amongst the Frontino and Bolivia Company's shareholders in the shape of a dividend. It will be noticed that the pumps, which were too small for the Silencio Mine, will be available for use at the Frontino and Bolivia Mine, and the pumps at Silencio will be at hand to be completed, and that they have not been used since the next mail. It is to be hoped that some of the rich ore from Silencio will be included in the monthly remittance. The directors had contemplated calling a general meeting of the company immediately after the arrival of the present mail, but owing to Mr. Robert White's absence at the mines no report from him can be received until the next mail; it is, therefore, proposed to hold the meeting during the next month. Looking at the organized condition in which the revolution must have left the country, and to the fact that the miners' returns do not comprise any gold from the Silencio or Palmichila Mines, the directors think that the profit for the month may be considered highly satisfactory.

**PESTARENA UNITED.**—The following are the returns for the month of August:—From the Val Toppa district 175 cts. 16 dwts. 23 grs. of gold, obtained from 416 metric tons of ore—yield per ton, 8 dwts. 13½ grs. From Pestarena district, 160 cts. 15 dwts. 1 gr., from 240 metric tons of ore—yield per ton, 13 dwts. 10½ grs. Total from both districts, 335 cts. 15 dwts., from 656 metric tons of ore amalgamated.

**BRITANNY MINERALS.**—John Edwards, Sept. 1: We have put the pump shaftmen to sink a winze in the bottom of the 70 fm. level, south of shaft, where the lode is worth 50¢. per fm. for the length of winze, 12 ft. The 70 end men we have put to stop the bottom of the 81d level, where the lode is worth 15¢. per fathom for lead ore. The lodes in Nos. 1 and 2 stopes, in the back of this level, are 27 ft. respectively. The 2d and 3d stopes are 20 ft. The machinery is in good order and working well. [Ore raised since last report, 10 tons.]

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### THE WEEK.

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**SATURDAY, SEPT. 1.**—Before official hours a devoted few made haste to buy Caledonian and North British, fearful that the low prices of the previous evening would never be seen again. They were made to pay 93 for British, and 133½ for Caledonian. At the close the former could be had below 91, and Caledonian at 126. A jump of 2 took place in Central Illinois, to 61.65. Russian of 1873 closed no better than 77½, holders on the Continent having during the last few days shown a wish to sell. New Quebrada shares again rose, now quoted 25½ to 2½. Last Chance, 20s. to 22s. 6d.; Alamillito, 1½ to 1½.

**MONDAY.**—Russian declined to 75½, and there was a heavy fall in Caledonian bonds, 3½ to 3½. The railroads were made to pay 93 for British, and 133½ for Caledonian and British. On the whole, operators for the rise had the best of it to-day, for although Caledonian showed no change at the close British after falling rather considerably finally left off at 93½, or 1¼ better. Local tram shares were thus quoted—Belfast, 9½ to 10; Bristol, 8 to 8½; Glasgow, 11½ to 11½; Hull, 13 to 13½; Leeds, 9 to 9½; Sheffield, 10 to 10½; Swansea, 9½ to 10.

**TUESDAY.**—A further fall of 8 took place in Danubian bonds, making 18½ for the two days. It appears that less than 25,000 £ will suffice to pay the coupons for the 27th inst., but the Government will not do so. The 1873 Russian closed at 86½, a rise of over 8½ on the day. The Caledonian dividend was made known to-day. It is to be at the rate of 6½ per cent., same as last year. Though a very good dividend, it proves a disappointment to recent purchasers at 130, who allowed themselves to be persuaded that 6½ would be divided. The stock fell to 125, or 1½ lower. British also fell 1½ on apprehensions of the dividend here also being a disappointment. For the last few days there has been some bidding in good quarters for New British, the market being at 15 to 20 for 3½. Parys Mountain, 1s. to 5s. Rockhops, 17s. to 19s. Carn Breu, 18 to 20.

**WEDNESDAY.**—British closed at 93, an improvement of ½, the operators for a rise overpowering the others. Caledonian had a fractional improvement. A circular has been issued by the Last Chance Company detailing the present position, which is favourably described. The shares were not affected. Had this company a few thousands in hand no doubt they might rise to the price of Flaggstaff. Cedar Creek, 3½ to 3½; White, 3½ to 3½; Van Consoel, 3½ to 3½; Port Phillip, 3½ to 3½.

**THURSDAY.** Tram shares are quoted:—Birchington, 11½ to 12; Belfast, 9½ to 10; Dublin, 17½ to 18; Edinburgh, 14½ to 14½; Glasgow, 11½ to 11½; Hull, 13 to 13½; Leeds, 9 to 9½; Sheffield, 10½ to 10½; Swansea, 9½ to 10. A Nottingham company is about to be formed with a capital of 80,000£., in 10¢. shares. Pestarena, 3½ to 3½; advices have been received stating that 335 cts. have been extracted from 650 tons of ore. Richmond, 4½ to 4½; a telegram states—For New British, the market being at 15 to 20 for 3½. The accounts published by Price's Candle Company show a profit of 19,560£.

**FRIDAY (Opening).**—The principal feature this morning is the continued firmness of Grand Trunk securities. Notwithstanding a rise of 2½ yesterday in the first preference they are now up to 47, while the second are 30, and the third 17. Last month the following quotations were ruling at one time:—First preference, 38; second, 21; third, 13. Though rates have been advanced 15 per cent. Caledonian, however, and North British have given way. Mining shares are being moderately advanced. British closed at 15 to 18. Illinois Central shares were 4½ to 5½. Van Consoel, 3½ to 3½; Alamillito, 1½ to 1½; Port Phillip, 3½ to 3½. Two o'clock.—Caledonian are 126½ to 126½; a rise of ¾. York, A, only 118½ to 118½; a further fall of 10s. Eberhardt shares are rather weaker, and have been dealt in at 5½. Richmond, 4½ to 4½; Quebrada, 2½ to 3; Kananga, 1 to 1½; Sierra Blanca, 1½ to 1½; Last Chance, 1½ to 2½.—Four o'clock.—Some rather important changes have taken place. Chatham Preference have fallen 1½, to 75½; the 1873 Russian, 86½ to 86½. Caledonian has strong support, now 125. Cedar Creek House shares are wanted by buyers, at 2½ to 2½. Eberhardt dull, and not better than 5 to 5½. Flaggstaff also lower.

FERDINAND R. KIRK.

Birchington, Sept. 7.

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### ENGINES FOR ROCK DRILLS AND STEAM HAMMERS.

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An improved engine, which is claimed to possess many advantages over those in common use, has been invented by Messrs. WINCHESTER and FLAGLER, of Boston, U.S. The buffers for relieving the concussion on the piston consist of two rubber discs arranged on opposite sides of the contracted portion of the steel sleeve. By this construction while the buffers are protected from injury by being enclosed within the extension of the cylinder, they are at the same time located outside of the steam chamber, the inner buffer only being exposed to the exhaust steam. The rubber buffers also located where the oil used to lubricate the piston head does not come in contact with them, and that they are thus protected from the injurious effect of the live steam, the oil, and particles of stone. The invention includes the construction of engine having its valve carried with the piston, and operated by the momentum imparted thereto by the movement of the piston, which construction allows the valve levers, stems, rods, and the like usually employed to be dispensed with; and also providing the piston with passages for the admission steam or air to move or sustain the valve. The engine has a cylinder provided on its exterior with a screw thread fitting into a holder or nut provided with a corresponding thread, and secured to the column or stand which supports the machine, whereby the auxiliary feed screw heretofore employed is dispensed with, which screw cannot be made of sufficient strength to resist the shock and wear to which it is subjected without being excessively heavy, and thus increasing the diameter of the machine. The invention also relates to constructing the nut or holder through which the cylinder passes of spherical form, this nut being held within a clamp or socket of a form adapted to receive it, so that the cylinder may be turned and held in any desired position.

For rotating the cylinder there is a ratchet mechanism, operated by an eccentric on the shaft which rotates the piston. The ratchet or pawl is pivoted to a bar or rod which slides through the holder or nut through which the cylinder is fed. The steam or compressed air is introduced into the cylinder through a hollow collar which communicates with steam or air passages in the cylinder head, and moves longitudinally with the cylinder, but does not rotate therewith, the steam or air passing through suitable passages to the inside of the cylinder. The rear end of the cylinder is provided with a shoulder, against which the cylinder head is tightly pressed by means of a sleeve screwed into the front of the cylinder, a series of sleeves and rings being interposed between them, whereby the cylinder head, sleeves, and rings are securely held in place; the employment of small studs, bolts or nuts, which are continually getting loose from the effects of vibration or concussion, being thus avoided. The invention also relates to a rock-drilling machine having one or more buffers located within an extension of the cylinder and outside of the steam chamber, whereby the material of which the buffer is composed is protected from the injurious effect of the live steam. And it also relates to a pair of buffers composed of rubber or elastic rings, with a metallic partition interposed, in combination with a piston having shoulders thereon arranged to strike the elastic buffers, whereby the shock is relieved.

It will be seen that by the arrangement adopted in this engine the shoulders of the piston, instead of striking any portion of the metal, strike the rubber buffers, thereby preventing the destructive action that occurs where the metallic parts come in direct contact. As nearly all the parts of this drill can be made by lathe-work, its construction is not costly. But a more important advantage is its compactness; it is as thereby practicable to produce an effective operating machine so small that it can be readily handled by a single operator, and used in the most cramped crevice, cut, or vein large enough to admit the operator, the entire length of the machine being about 18 in. It is thus especially adapted for use in mining operations and in places where the drills ordinarily made cannot be used for want of space. Another advantage in the absence of valve levers, stems, rod, cams, and similar parts, the number of wearing parts, and the liability of breakage, as well as first cost, being thus materially reduced. Although the said improved drilling machine is described as being operated by steam, it will be understood that it



month were 1900 tons in pure copper, made up of 1400 tons pure copper  
tons ores and regulus for England, and 200 tons pure copper for the

### The Mining Market: Prices of Metals, Ores, &c.

much preferred, and also in regard to its weight; although in the United States the quality of the copper is good, yet there are some instances, as we have seen in other descriptions, and it must rather puzzle some of our continental buyers at times to know which they ought to take, and it may, therefore, interest them to learn in what estimation the several brands are held in England; so for their guidance we will state that the Tarsus copper is very good, and Sweetland's though is much approved, but none compares to Logan's best selected.

IRON.—There is still comparatively few orders given out, and the effect large sales sellers would have to submit to further concessions; prices, however, have now receded to such a figure that business ought to increase, as the price cannot stand in the way of business, and there is no doubt that buyers would be content with the reductions that have already taken place were it not for the lower prices still ruling for Belgian Iron. Belgian bars can be bought at \$5. 75. 60 to \$5. 100. delivered in the times, and the American bars are a person dearer, and so will be, as they are mostly noted above that rate. The Belgians are not so well in getting their iron taken by buyers that many will not take English as long as they can obtain Belgian at any cheaper rate, and unless the English masters are going to remain indifferent to the loss of this portion of the trade it seems as though they would ultimately have to modify their prices more in conformity to those of Belgium. The common bar and nail rod trade is an important branch, and should not be relinquished without a struggle to retain it, but go will, and that forever, if masters do not bestir themselves in the matter, and out of the Belgium.

As the Belgium sells iron delivered here cheaper than it can be sold by our own makers; if the Belgians are selling below cost price there is a answer to the question at once, and we know that there must soon be an end to that sort of business, but from their eagerness to secure orders at current rates we doubt very much whether they are making any sacrifice, and if they are not the we ought to find out quickly in what respect the difference lies that the one country can produce iron at a profit while the other incurs a loss. There is not only the difference in the cost of production but freight and insurance and other charges to be borne, but as Belgium and at these yet our own iron can be sold here at a price cheaper than English. Now, the first consideration for the trade is in the manner this is done, for it is far better that it should be known, even though the remedy be beyond our control, and if obliged to surrender our claim to being the cheapest sellers in the world we must calmly submit to it, but it should be proved that the Belgians possess means which we do not for raising and manufacturing iron with greater facility and less expensively, but until then it is questionable whether they have natural advantages superior to us, and if it is only in the plan of working then it is a reflection upon our works that they have allowed

The present difference that exists between the price of Welsh and Staffordshire is more than the average. Welsh bars are at 4s., and from what we have previously stated in regard to Belgian that price is more likely to be lower than higher, and Staffordshire brands are mostly quoted about 8s.; there are some makers who will accept less, and as low as 7s. 5s., but the majority of sellers of ordinary bars quote about the former figure; this is too much, as a very good quality of bars certainly ought to be obtainable at 20s. per ton upon Welsh iron, sometimes the difference between Welsh and Staffordshire has not exceeded 10s. per ton. Every effort at a dull time like the present should be put forth to induce buyers to purchase, and there should be no room for complaint. Swedish bars have been in fair request, and sheet bars have realised 9s. 7s. 6d. The reduction in the make of Scotch pigs has not produced much effect, and after next month we may expect to see prices again on the decline. The stock in store is 157,632 tons, being an increase of 8143 tons, with warrants in circulation for 140,000 tons. Middleborough iron has also been uninfluenced to any extent, and the market for that most part has shown very little vitality. Quotations f.o.b. Tees, No. 1, 44s. No. 3, 40s. 6d.; foundry, 39s. 6d.; No. 4, 39s. The stock in Connal and Co. yards is 22,650 tons, being an increase of 33.3 tons, with warrants in circulation for 22,100 tons. The Glasgow report shows the following:—

SHIPMENTS.	
Week ending Sept. 2, 1876	Tons 9,637
Week ending Sept. 1, 1877	9,281
Decrease	356
Total increase for 1877	9,077
Imports of Middleborough pig-iron into Grangemouth:—	
Week ending Sept. 2, 1876	Tons 4,780
Week ending Sept. 1, 1877	4,733
Decrease	44
Total increase for 1877	47,433
FURNACES.	
In blast Aug. 25, 1876	115
In blast Aug. 26, 1877	87

Scotch pigs are quoted 54s. 6d. cash.

**QUICKSILVER.**—The advanced price of 9s. proved entirely non-

nal, and the trade having been very slack all the week, importers reduced their quotation to 8*l.* 10*s.* and 8*l.*, without, however, leading to any business of importance. To-day importers are sellers at 7*l.* 17*s.* 6*d.*, and would, probably, not refuse 7*l.* 15*s.* for a few hundred bottles.

Tin.—The next public sale in Holland of Banca will be held on the 26th inst., and consist of 21,500 slabs, and 3500 slabs Billiton. The advices from Rotterdam do not give a very favourable account of the market for the past month. Although there was a fair demand for consumption, yet prices continued weak and declining; and upon a slightly favourable turn near the close of the month sellers manifested eagerness to avail themselves of it, consequently the market closed flat. The New York market is also reported quiet, and prices nominal. Banca, 17*½* c.; Straits, 15*½* c.; English, 15*c.* In the absence of buying, the arrivals of tin were being stored. Our market has not shown any particular change during this week, and prices of Straits have ranged between 64*l.* 10*s.* and 65*l.*, and Australian about 63*l.* 15*s.* The actual stock of tin again shows a slight decrease for August, and the deliveries for the month of July prove that consumption is rather diminishing. The reduced price has had no perceptible effect at present on supplies from the Antipodes, and it is not generally expected that any sensible impression will be made. From all accounts there is an abundance of tin there, sufficient to last for years even at the present rate of supply, and the working expenses hitherto have been comparatively trifling, and it appears that they can drive a large trade and have a good profit attached to it yet. There is no doubt 60*l.* per ton is a noble price to realise, and if the quantity exists, and is accessible, as it has been represented to be, there is no reason why the trade should be supposed at cheaper rates than this. We should very soon find a market for the increased supply, and at a matter of price, and if the Australians can afford, and are willing to give us the benefit of a cheap metal they need not fear but what we can take all they can give. In a short time the wool shipments will be coming on, when tin can be shipped at more ballast rate; and, if the quantity should happen to be in excess of that which we have been hitherto receiving, the market will be doomed, and holders will only add to their losses by retaining their stocks. There is a fair chance of

**THE IRON TRADE.**—(Griffiths's Weekly Review).—Friday Evening. At Glasgow the market has been quiet during the week. On Tuesday a moderate business was done, and prices touched 54s. 9d., but have relaxed again slightly during the last few days, and close this evening 54s. 6d. sellers, about 2d. per ton below the price last week. It will be seen from our usual quotations of maker's No. 1 iron that the prices of Gartsherrie and several other brands have been reduced. Gartsherrie, 62s.; Colnacre, 57s. 6d.; 6 f.o.b. Glasgow, 56s. 6d.; Langston, 56s. 6d.; Summerlee, 60s.; Muckhart, 60s. 6d.; 6 f.o.b. Glasgow; Gleadarnock, 58s. 6d.; Eglington, 58s. 6d.; Shotts, 61s. 6d.; 6 f.o.b. Leith; Kennell, 55s. 6d.; 6 f.o.b. Boness. Sufficient time has not yet elapsed since the official change in the price of marked Staffordshire bars to enable us to form an opinion as to how far the reduction will stimulate demand. The change will, no doubt, lead many continental and colonial consumers of English iron who have latterly been using North Country brands to specify for Staffordshire iron now on the market. Between the prices of the two districts there is more than 10s. before the reduction. The Directors of the Iron Works of India has intimated to-day that he is prepared to receive tenders for the supply of 6400 tons of iron, or 6500 tons of steel rails, and about 600 tons of accessories.

the Birmingham Exchange yesterday the attendance was somewhat smaller than usual. There is a slight improvement in the finished iron trade of the Black Country. In the pig iron trade, however, there is no change. The Cleveland iron trade is somewhat affected by the political situation, but the official statistics, which are not so satisfactory as was anticipated. Prices are slightly easier towards the close of the meeting at Middlesbrough, on Tuesday. Barrow and the West Coast continue in the same healthy state which has happily characterised the district for some time past. There is a somewhat improved feeling in the tin-plate trade, but prices are unaltered at present. During the first seven months of the present year the quantity of tin-plate exported from the district, the figures were 75,448, and in 1875, 85,312. In the metal market generally very little is doing. Tin and copper are quiet, values unchanged.

**Messrs VIVIAN, YOUNGER, and BONDE-COPPER:** There is nothing especial to remark in the undernoted figures. The consuming trade is scarcely so good, and the war in Europe, and the difficulties in India, will be a good reason for that being so. The result, however, that buyers take nothing beyond their own requirements, and as now the smelters are getting more ores from various sources, and are taking the opportunity to buy them at moderate rates, and the Chili importers too, are making purchases abroad freely at prices which induce them to seek buyers here at quotations, the article has been much offered, and the price for the month has fallen 1s 6d per cent. The quantity of metal in the fortnight of the month were equal to 1460 tons in pure copper, consisting of 750 tons of metal, and the balance for England, and 800 tons bars for the Continent; those for the last half of 1875

Messrs. P. SANDER and Co.—The metal market has been very quiet during the past month, and prices generally show a decline. —INOX continues in only a moderate demand. The reduction dating from Sept. 1 in the price of marked bars, little or no effect, the trade generally having already disposed of their stocks. —CORNER and Chill bars have given way about 25s. a ton, to-day's price being 61s. 6d. to 62s. 6d. —CINCHON has been in moderate demand, but the price is rather firmer, and English in moderate demand has passed. —TIN—The market stood at 66s. a ton for Tasmanian and Australian, and 66s. 10s. for Straits. —At the beginning of last month, gradually fell to 63s. 10s. and, for Straits, to 62s. 10s. Business took place. About the middle of the month a slight improvement occurred, which has been mostly lost, and the market closes to-day (Sept. 28) at 63s. 10s. for English and 62s. 10s. for Straits. —TIN-PLATE has been in moderate demand at rather easier prices. The market for the expired portion is still in demand, but not so much as the two preceding years. —LEAD has been in moderate demand, and the market has been quiet. —SPELTER is rather weaker. —ANTIMONY remains steady.

Wheat Agate,  $\frac{2}{3}$  to 3; Wheel Grenville, 30s. to 35s.; Wheel (St. Agnes),  $1\frac{1}{2}$  to  $1\frac{1}{2}$ ; Wheel Unity,  $\frac{1}{2}$  to  $\frac{3}{4}$ . South Conduw, 74; at the meeting the accounts, charging up the costs to Agate, showed a profit of 19917. 3s. 8d. on four months' working, a balance in hand of 38817. 6s. 5d. A dividend of 6s. per share declared (18364. 18s.), leaving a balance in favour of the company 20441. 8s. 5d. The agent's report was considered very satisfactory. West Poldice meeting was held on Friday, the accounts charged costs to the end of April, and crediting 50 tons of tin (19557. 85 tons of copper (3524), showed a profit on four months' work of 64s., and a debit balance of 535s.

Among COPPER MINES Devon Great Consols are quoted 34, owing to the lowness of the copper standard it has become necessary here to reduce the production of low-priced ores as much as possible. The sampling on Friday was 1023 tons. West Tail 72 $\frac{1}{2}$  to 77 $\frac{1}{2}$ . Wheel Crebor,  $1\frac{1}{2}$  to 2; the lode in the 120 east is 20f. per fathom, and opening out well. The stope in the bar worth 10f. per fathom. The 103 end east is worth 10f. per fathom. The ore dressed towards the next sampling is from 160 to 170 f. of ore. South Caradon, 100 to 110. Parya Mountain have decreased to  $\frac{1}{2}$ ; the mine is improving, but shares have declined, owing the shareholders not coming forward as it was expected to suit Morfa-du. East Caradon,  $\frac{1}{2}$  to  $\frac{3}{4}$ ; Marke Valley,  $\frac{3}{4}$  to 1; Prim Water, 1.

The Market for Mine Shares on the Stock Exchange has of somewhat more animation, and prices are better maintained, although it is only in very few instances that any actual advance is quoted. Amongst the exceptions may be mentioned Pontagorda, which has advanced fully 1½, the present quotation being 25½, and New Quebrada, the present quotation for which is 2½. Cape Copper has been stronger, and closer prices are quoted, as there has not been any large amount of business doing in it. Flagstaff and Frontino and Bolivia have also slightly advanced, whilst Eberhardt and Aurora have receded. It has frequently been remarked that if there is a lack of business principles in the management of mines there is an utter absence of them in the management of meetings, and a proof of this was afforded at the meeting of the Ladywell shareholders on Thursday, where nearly two hours were consumed in attempting to do business which need not have occupied 20 minutes. The shareholders who brought forward an informal resolution being totally ignorant of the contents of their own Articles of Association, and the Chairman and managing director, either from an effort to be over-courteous or from want of knowledge of the rules of public meetings, suffered the time of those who had any business to attend to to be wasted by permitting the meeting to break up into friendly little groups for the discussion of matters in a private and desultory manner. The Articles provide that there shall be not less than three directors more than six directors, and that their remuneration shall be 2500. per annum until the mine pays dividends, and 5000. afterwards.



desired, and yielding some very fine ore. Llanidloes, 1½ to 2½; the main shaft is being sunk below the 84 in very favourable ground. The lode in the deep workings is looking better than at any other point in the mine, and some splendid lead has this week been raised from the bottom of the shaft. Prospects were, it is said, never before so good of opening out a rich mine in depth.

Pateley Bridge, 2 to 2½; the 30 east, on Rake vein, is rapidly approaching the rich run of ore ground left by the old company—reported to be 18 in. wide, solid metal. The 30 west, on same vein, is also looking exceedingly well. Other parts of the mine unchanged. Smelting going on steadily, and 25 tons pig-lead in store. West Pateley, 1½ to 2; several improvements are reported this week, and occasional stones of ore are being met with in the 56 fm. level, on the Craven Cross vein, as the end is extended under the old workings, where it is reported that the lode went down yielding 3 ft. of solid lead.

Subjoined are the closing quotations:—

Asheton, 1 to 1½; Crau Brea, 1½ to 20; Devon Great Consols, ¾ to ¾; Dolcoath, 2½ to 3; East Caradon, ¼ to ¾; East Van, ¼ to ¼; Glenroy, 1 to 1½; Glynn, ¼ to ¾; Great Laxey, 1 to 2½; Hingham Down, 1 to 3; Leadhill, 5 to 5½; Marke Valley, ¼ to 1½; Parsy Mountain, 3 10ths to 5 10ths; Pateley Bridge, 2 to 2½; Pennerley, ¼ to ¾; Penruthal, 4s. to 6s.; Roman Gravels, 9½ to 9½; Tankerville, 6½ to 6½; Van, 30 to 32; Van Consols, ¾ to ¾; West Asheton, ¾ to 1; West Chiverton, 10 to 12; West Pateley, 1½ to 2; West Tankerville, ¾ to 1; Wheel Grenville, 1½ to 1½; Almada and Tiritó, ½ to ½; Argentine, 2½ to 3½; Birdseye Creek, ¾ to ¾; Blue Tent, 3 to 3½; Cape Copper, 37 to 38; Cerrito, ¾ to ¾; Chales, ¾ to ¾; Colorado Terrible, 1½ to 2; Condor, ¾ to ¾; Chili, 2½ to 3½; Don Pedro, 1 to 2; Eborac and Aurora, 5½ to 5½; Exchequer, ¾ to ¾; I.X.L., ¼ to ¾; Emma, 1 10ths to 3 10ths; Flagstaff, 2½ to 2½; Frontino and Bolivia, 2½ to 3½; Huatafall, 5½ to 6½; Javali, 1½ to 3½; Kapanga, 1 to 1½; Last Chance, ¾ to 1½; New Pacific, ½ to ¾; New Quebrada, 2½ to 3; Pestarene, ¼ to ¾; Plumas Eureka, 2½ to 3½; Port Phillip, ¾ to ¾; Richmond Consolidated, ¼ to ¼; St. John del Rey, 20 to 30; San Pedro, ¼ to ¾; Sierra Buttes, 1½ to 2; South Aurora, 3 10ths to 5 10ths; Teocoma, ¼ to ¾; United Mexican, 1½ to 2; Tincouth, 9 to 10; Oregon pref., 4 to 4½.

COLLIERIES.—Colliery shares have been attracting more attention, though only in a degree insufficient to produce any very material change in prices. Increased enquiries for this class of investment have, however, rendered prices firm, and prove that renewed attention is being directed to investments which must at present prices turn out very profitable. The coal trade throughout the kingdom shows signs of improvement, which is now likely to continue, and the iron trade has taken a favourable turn. We hear that considerable orders for steel rails have been lately put in hand for the Indian Government, and the demand for this and other forms of iron are now coming in from sources to which for some time past no manufactured iron has been sent. The northern coal fields are gradually becoming more busy, owing to improved demand for all qualities, especially house and gas coal. The arbitration in the Northumberland dispute has been completed, and the award is in favour of the miners, whose wages will consequently not be reduced.

In the Swansea district the export demand continues good, and the general improvement in the trade of the neighbourhood a very marked one. The collieries and ironworks formerly worked by the Yaisgedwyn Company have been recently purchased by a strong London firm, who will probably form a company to work the property. As the purchase appears to have been made on very favourable terms it is tolerably certain that by whatever this valuable property may be worked it will return very handsome profits.

We are glad to hear that the Thorp's Gawber Company are looking up again at their Colliery. The directors' report, just issued, recommends the payment of the dividend on the preference shares for the past-half year, and this is a move in the right direction. The shares remain at about 2½. Newport Abercrombie are 3 to 3½; the sinking is progressing rapidly, and the second shaft is expected to reach the Black vein before the end of the present month. Chapel House are firm, at about 3; the sinking of the new pit is proceeding well, and business is much improved, even though it has been no satisfactory throughout. The sales of coal at Alltani have lately been largely increased, and the general progress is good. The shares close at 4 to 4½. The Nerubudda Coal and Iron Company have, with the sanction of the Court of Chancery, reduced the capital from £50,000 to £30,000, the shares having been consolidated at 3£, with 2£ per share paid up. Messrs A. Good and C. F. Finney have been appointed official liquidators of the Oakham Colliery Company. Mold Argued are at 3 to 3½; Llay Hall, 9 to 10; Cakemore, 1½ to 2½; Cardiff and Swansea, 1½; New Sharnston, 3 to 3½.

At Redruth Ticketing, on Thursday, 2027 tons of copper ore were sold, realising 8297½ 11s. The particulars of the sale were—Average standard, 86½ 18s.; average produce, 7½; average price per ton 4£. 2s.; quantity of fine copper, 159 tons 13 cwt. The following are the particulars:—

Date.	Tons.	Standard.	Produce.	Per ton.	Per unit.	Ore copper.
Aug. 2, 1288 .....	£ 90	14 0 .....	8 .....	£ 9 6 .....	11s. 2½d .....	£2 0
" 23, 2670 .....	94	16 0 .....	6 .....	3 2 6 .....	10 .....	58 0
Sept. 6, 2027 .....	86	18 0 .....	7½ .....	4 2 0 .....	10 5 .....	51 19

Compared with the last sale, the decline has been in the standard 1£. 7s., and in the price per ton of ore about 2s. 6d.

The Nerubudda Coal and Iron Company announce that under special resolution, and with the sanction of the High Court of Chancery, the capital of the company has been reduced from 250,000£. to 150,000£.; also that the shares have been consolidated, and now stand as 3£ shares, with 2£ per share paid up thereon.

\* \* With this week's Journal a SUPPLEMENTAL SHEET is given which contains—Original Correspondence: Rock-Boring Machinery.—No. VI. (Darlington); California Clamps; Boring Machines (S. Wilkins); Mining in the East—No. XX.; Peru, and the Silver Mines of Cerro de Pasco (W. R. Rutter); Hydraulic Gold Mining—a Suggestion; Colliery Working—the Suspension of a Manager's Certificate; Colliery Managers' Association Limited Liability; "Copper Mining" as an Investment (R. Trelinnick); Lead and Lead Mining (R. Trelinnick); Crau Brea and Tincoff Mines Mining in Cardiganshire (A. Francis); Penruthal Mine; Wheel Grenville; Treilch Wood; Profitable Investments (T. J. Barnard); the Monte Mente; Heavy Premium for Mines (J. Bunyan); Mines with several Aliases—Last Chance Silver Mining Company of Utah—Almada and Tiritó Consolidated Silver Mining Company—Royal Exhibitions—Half-Yearly Foreign and Colonial Mining Share List (E. Ashmead); Improved Elevator—Patent Matters—Meetings of Argentine, Lylwell, South Condurrow, West Pateley Bridge, and East Van Companies, &c.

Mr. J. H. MURCHISON, F.R.G.S., and Capt. R. WATERS, have returned this week from Norway, where they have been examining some very valuable copper mines, which have already yielded, and are still giving, large returns and good profits, though no capital has hitherto been expended upon them. In connection with the mines there is a very extensive freehold property covered with valuable timber, more than sufficient for fuel for engines and for mining purposes. Capt. R. Waters is brother to Capt. A. Waters, the manager of the Tankerville, Roman Gravels, and Leadhill Mines, and he (Capt. R. Waters) is well known as a practical man of extensive and varied experience, possessing also a sound and cautious judgment. His report on the above property is, therefore, looked for with unusual interest, and will deserve the importance which is certain to be attached to it.

WEST PATELEY (Lead).—Some important improvements are reported this week, and in the 56 fm. level a cross-vein has been discovered, carrying a small leader of lead ore on the footwall. The Craven Cross vein now produces occasional stones of lead ore—an encouraging feature to present itself as the end approaches the perpendicular of the rich ore body gone down in the old workings. The Rake vein in the bottom of No. 2 shaft has increased in value now worth 30£ per fathom. The discovery vein in new shaft has also much improve!; at the date of the recent meeting it yielded stones of lead ore; it is now worth 10£ per fathom; and the lode in No. 1 shaft, in the 10 east, has improved from a mixture of lead ore to 5 cwt. per fathom. The crusher is completed, and the water wheel for working it will be on the mine next week. Smelting will be commenced very soon.

FRONTINO AND BOLIVIA.—The directors have received advice under date July 12, accompanied by a remittance of gold valued at 14,580£., the produce of the mines, and for gold purchased at the mines, for the 11 months ending June. The profit for the month 469£., a most favourable result, when it is recollected that no return has been made for the company's richest mines, Silencio and Palmichala. Of the above remittance 12,000£. has been received by the company's bankers to provide for the cost of the last 11 months. The Silencio Mine has been unwatered, and by the next mail the directors hope that some of the rich ore from that mine will be included in the remittance. Looking at the disorganised state in which the revolution must have left the country, and to the fact that this month's returns do not comprise any gold from the Silencio or Palmichala Mines, the directors think that the profit for the month may be considered highly satisfactory.

CAPTAIN ABSALOM FRANCIS  
MINING AGENT,  
ENGINEER, AND SURVEYOR.  
COGNAN, ABERYSTWYTH.

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15 Almaida, 5s.	10 Huistafel, 25s.	10 Richmond, 1s. 11s. 3d.
15 Bampfyde, 6s. 3d.	25 Last Chance, 17s. 6d.	5 Roman Grav., 19s. 12s. 6d.
50 Bodirris, 21s. 2s. 6d.	10 Llanrwst,	25 Tolima, 1s. 1s. 3d.
20 Condes of Chilli, 2s. 6d.	10 Leadhills, 1s. 12s. 6d.	10 Tankerville, 25s.
50 Colorado, 2s. 6d.	5 Leth, 1s. 1s. 6d.	25 Tan Consols, 11s.
25 Cakemore, 2s.	20 Mike Valley, 19s.	5 W. Craven Moor, 10s. 10s. 6d.
25 Chicago, 2s. 3s. 9d.	5 Malabar, 5s.	5 W. Wye Val., 43s. 6d.
5 Devon Consols, 1s.	25 Mon. Gorddu, 2s. 1s.	5 Wye Valley, 23s.
10 Derwent, 2s. 1s. 3d.	10 Pennant, 2s.	5 W. Chiverton, 11s.
10 Eberhardt, 2s. 1s. 3d.	30 Pestarena, 4s. 3d.	20 W. Goginon, 13s. 9d.
30 East Caradon, 7s. 3d.	30 Pantora, 16s.	25 Kapanga, 1s. 5s.
15 Exchequer, 4s. 9s.	10 Pateley Bridge, 12s. 5s.	50 W. Tankerville, 19s.
20 Frontino, 2s. 1s. 1d.	60 Farys Mount, 6s. 6d.	50 W. Godolphin, 2s. 1s. 3d.
20 Flagest, 2s. 1s. 3d.	25 Kilmains Beach, 20s.	50 W. York Peninsula, 5s. 6d.

GREAT HOLLOWAY—SPECIAL RECOMMENDED.

Shares bought and sold at net prices. Telegrams promptly attended to.

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"Contains a good deal of information that may be useful at present. Mr Murchison's theory is briefly that on the average British Lead Mines have less the lottery element in them than any others, and the figures he gives seem to support that view; at all events, those interested in this industry will find his facts and observations worth reading."—*Times*.

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## Notices to Correspondents.

\* \* \* Much inconvenience having arisen in consequence of several of the Numbers of the past year being out of print, we recommend that the Journal should be kept on receipt; it then forms an accumulating useful work of reference.

STB.—I should feel thankful if any correspondent could inform me if anything is being done with the Archa Island Gold Mining Company's property. If they can, through the medium of your Notices to correspondents, they will oblige—ONE INTERESTED.

The letter of "Responsibility," on the suspension of Mr. John Newey's certificate at Dunley, shall appear next week.

STB.—What is "Redding?"—INQUIRE.

RECEIVED.—"W. S. L." (Dublin)—"M. P." (Starcross): Shall be glad to hear again.—"W. T." (Cappagh)—"E. W. B." (Shareholder) (New Quebrada)—"Con-stant Reader" (Manchester)—"Shareholder" (Van Consoles)—"Meritor" (Leeds)—"Ye" (Shareholder) (Wheal Grenville)—"Shareholder" (Carn Brea)—"M. B."—"R. O."—"F. G. S." (New Quebrada): The letter can only appear with the writer's name attached—W. Weston (Colorado): Next week.

## THE MINING JOURNAL.

### Railway and Commercial Gazette.

LONDON, SEPTEMBER 8, 1877.

#### THE TRADE IN THE SUPERIOR METALS FOR TWO-THIRDS OF THE YEAR 1877.

There are certain periods of the year when persons interested in mines regard with enquiry and some anxiety the condition of the metal market, and especially the course of commerce in relation to it. One of these periods now occur; two-thirds of this year have passed away, the first autumn month has just expired, and all interested in British mines, as investors and workers, are desirous to ascertain what hope of an autumn trade, especially in tin, copper, and lead, have the transactions of the month of August afforded. The time of expectancy, doubt, apprehension, and hope has been long; not only has it filled up two-thirds of this year but the whole of last, and all concerned are asking what are our prospects? In our long experience of mining affairs we have never known the courage and hope of mining men to be so continuously sustained as during the dark dull season they have experienced. This has arisen from the conviction that the war alone prevents revival, and that there is some reason to believe it may pass away without a general conflagration, and without involving our own beloved country in the conflict. It has been often said war creates a demand for metals, and this ought to have done so, as it has been exceedingly wasteful. The irregular levies of Turkey on the one hand, and the Cossacs on the other, never tire of useless firing, take little care of their arms, and, of course, some demand to supply the consumption has existed, and it must very much increase to replenish the nearly exhausted arsenals of the belligerents.

But the universal alarm prevents business, and the expense for armaments to which Europe has submitted deprives our customers of the means of buying our metals for commercial, manufacturing, and domestic purposes. Nations had large armies, now every European is a soldier who can bear arms, every country is a camp, but even in camp, march, bivouac, and barrack arms wear out, and ammunition is consumed and wasted, so that for military purposes our supplies as well as inferior metals will be wanted in large quantities. Of course, these considerations still sustain expectation, notwithstanding the decreased power of our customers to buy for strictly commercial purposes has diminished.

The statistics of the first month in autumn and of the first eight months of the year are here supplied, accompanied by such suggestions and comments as the situation calls for.

Let us first notice the products of our tin mines, the oldest industry of the kingdom, older than agriculture itself in any of the forms to which we give the name. So much has the production of tin been identified with Britain, a fact rarely ever noticed may be stated, that the name of the country is derived from it; not as Hume and so many other historians have said, from the tints given to their bodies by the Britons, derived from certain pigments. When the Greeks discovered that Cornwall and the islands off its coasts supplied the Phoenicians with tin they found that the latter knew the country by the name of the Britannic Isles. The name is Phoenician, and Celtic scholars recognise the word Britannia as describing "the land of metals." In Syria the word Barattania (from which the word Britannia is derived) means "the land of tin." The Greeks designated the Britannic islands Cassiterides, as is plain from the writings of STRABO and HERODOTUS. This word is derived from Cassiteros the Greek name for tin. In ancient maps the word Cassiterides is placed under Britain. It would appear now as if Britannia were transferred to the Antipodes, for Australia is becoming the great tin land, but many of our correspondents believe that with more economical mining and smelting the old Barattania, or Britain, will still hold her own, however "New Britain," as it would be appropriate to call Australia, may flourish.

Giving tin, therefore, priority of notice, we find that in the first month of the present autumn the imports were in all forms—blocks, ingots, bars, slabs, and regulus, of the value of 111,264*l*. It will be observed by the readers of the Journal that the imports have declined in value for several years, not only from the low prices obtainable in this market, but from decidedly smaller quantities having been sent hither. In August last year the value was 121,889*l*. For the first two-thirds of this year the value was 759,082*l*, as compared with the same eight months last year, when it was 869,612*l*. There is no novelty in the direction from which the imports came, but it may be observed that there is less fear in Cornwall of the competition with the Dutch Settlements, of which the capital is Sumatra, and more apprehension than there has yet been of the rivalry of "New Britannia" (Australia), as we have for the nonce termed it. This arises from the intelligence received of projects having begun there for mining, and not merely picking up stream tin.

Of the quantity imported the value of what was re-exported amounted in the month to 20,671*l*, and in the first two-thirds of the year to 182,796*l*. The re-export has declined, but not to the same extent as the imports. Nevertheless stocks are heavy, and holders hold on, "hoping against hope" for a rising market. In the two corresponding periods last year the values of re-export were respectively 21,128*l* and 331,750*l*.

The exports of British tin were valued in August at 39,011*l*, and in the eighth month of last year at 28,967*l*. During the eight months the value was 304,528*l*, compared with 276,705*l*, the previous year in the same time. This is an account of tin unwrought. There are no returns to enable us even to guess at the value of manufactured articles of tin, whether imported or the produce of Cornwall. There is no novelty in the destination of what we have shipped. The United States is still our best customer, and took two and a-half as much more from us this year as in the same time last. France, Germany, and Russia have, however, fallen off, particularly the first named.

Lead is a very old commerce of Britain. We learn from Scripture that the ships of Tarshish, a name given to England also (but the ships were rather bringers of merchandise from Tarshish than ships of Tarshish), supplied the markets of Tyre with "silver, tin, lead, and iron." Ezekiel describes Tarshish as a merchant (or trader) of (or with) Tyre. Now, it is very doubtful whether a "native" silver mine was ever discovered in Britain, but both in Britain and Ireland (or Ierin) silver-lead mines existed, and yielded the former metal generously. The Phoenicians gave the name of Britanic to both islands, and there is abundant proof that they worked lead and copper mines in Ireland, the latter yielding gold and both yielding silver. There is unquestioned evidence of Phoenician enterprise in Ireland in the brazen swords and other implements of war and peace found in vestiges of mines wrought in a great antiquity. We know that the Roman worked lead mines in England and Wales,

but they were less expert than the Phoenicians in extracting the silver. Lead mining is again reviving, and no form of mining operation is, probably, more certain of eventual prosperity.

Our imports of the metal for the first month of this harvest were of the value of 116,687*l*, in the same month last year 140,033*l*. During the eight months which have transpired this year 1,363,631*l*, and in the corresponding months of 1876, 1,136,406*l*. The export of British Lead last month was of the declared value of 103,206*l*. In the month corresponding last year it was 89,771*l*. For the eighth month of 1877, 615,831*l*, and for those of 1876, 547,495*l*. There are no new phases in either import or export trade. The Chinese, through the media of British merchants chiefly at Hong-Kong, are the largest receivers of British lead, and their custom, although so much larger than any other nation, goes on increasing, and is likely to do so as long as their tea trade flourishes, in connection with which it is chiefly employed, especially by the foreign merchants who export to Europe and America. The increase last year is prodigious, from 141,476*l* to 231,296*l*.

The copper trade continues to represent the largest money value in connection with commerce in any of the superior metals. The imports are classified under the heads of ore—regulus, including precipitate, and unwrought, or part wrought. Of the first the value this year so far has been 759,984*l*; last year in the same space of time 613,068*l*. Of the second in the same period 886,123*l*, and 828,388*l*, respectively. Of the third 2,042,674*l*, and 2,054,749*l*, respectively. During August the value for ore was 120,645*l*, against 70,580*l*, in August, 1876; of regulus, 140,597*l*, against 148,296*l*, respectively; and of unwrought, or part wrought, 276,051*l*, and 224,520*l*, respectively. The ore is received from a great variety of places; Chili and Australia are about equal, and yield together one-third of the whole. Chili sends regulus to half the whole amount. There is little wrought or part wrought copper derived from any country but Chili and Australia, the former holding to the latter the proportion of two to one.

The re-shipments of foreign copper are considerable. No ores or regulus, or precipitate are included, for reasons which must be obvious to every reader of the *Mining Journal*, but wrought and unwrought was exported to the value of 724,025*l*, during this year; last year in the corresponding period it was 909,009*l*. For the month it was 80,981*l*, and for August, 1876, 135,178*l*. British copper was exported in various forms. Wrought or manufactured was of the declared value of 669,445*l*, for this year up to August 31, which, compared with last year, shows a trivial increase. Ingots, cakes, and slabs were valued at 539,786*l*, and last year up to the same date 653,253*l*. During the month this form of cupreous production was valued at 66,955*l*, and for the month ending August 31, 1876, it was 72,574*l*. Wrought copper for the month 79,144*l*, compared with 82,184*l*.

Yellow metal sheathing was in less demand last month than was expected to be the case, nevertheless it figures for 111,751*l*, and at the corresponding date last year it was 65,319*l*; for the longer period, 839,600*l*, and 600,216*l*. The total value of the shipments of British copper and yellow metal sheathing was 2,048,831*l* for two-thirds of the year, and 1,917,177*l* for the same period last year. The figures for the shorter periods were 256,950*l* and 220,077*l*.

Brass, not comprising ordnance, stood at the longer period for 292,919*l*, and the shorter 47,811*l*; last year for the similar periods 327,498*l*, and 43,617*l*. Arms and ammunition, which involved both copper and lead, were valued at over 800,000*l*, in the greater period, and 120,000*l*, in the lesser. Last year in those spaces of time they figured at a little more, probably owing to war preparations. We have not observed any marked change in the course of the copper trade. British India was by far our best customer, importing wrought or manufactured copper to about a third of the whole, besides taking considerable quantities of unwrought. France was the chief customer in that department; but, all forms of our cupreous exports considered, France was considerably behind India. It is to be feared that the existing, and still more extensively impending famine in that Empire will lessen our exports of metals thither. Germany is a good customer for ingots and cakes. In proportion to its population Holland consumes, or at all events receives, vastly more than any other country. The United States is our worst customer. This country is a large importer of pyrites, which, taking copper, sulphur, and iron together, were valued since the year commenced at 1,212,866*l*, and during last month at 145,750*l*. In 1876 they were appraised at 990,048*l*, and 103,343*l*. These we require for our manufacture, and no portion is re-shipped.

The imports of zinc, crude, in cakes, and manufactured taken together, were since Dec. 31 last valued at about 663,000*l*, and during the month near 100,000*l*. Last year the computations were 610,000*l*, and 75,000*l*. The exports of British zinc or spelter stood in value at 85,483*l*, since Jan. 1, and for August 12,489*l*. The exports of British spelter will be seen to be insignificant, and under that name some foreign spelter there is reason to believe was comprised. A considerable quantity of black jack is found at home, and our lead mines yield much blende, but it is nearly all consumed here, and we need heavy supplies from abroad. The iron makers still complain that zinc is kept up at an unreasonable price by speculators for a rise, impeding the manufacture of galvanised iron.

Quicksilver was imported from Spain and California to the value 295,077*l*, in the eight months, and 6215*l*, in August last. In 1876 the sums estimated were 329,289*l*, and 5100*l*. Of this we re-shipped this year to the value of 160,134*l*, and during the month 19,355*l*. The values last year were not materially different. The producers of quicksilver in California complain of a falling demand in Europe, and stocks are in consequence becoming heavy in San Francisco; this seems unfavourable to firms holding here. It is evident from the above statistics carefully compiled from the returns of the Customs House to the Board of Trade, and from the latter to the House of Commons, that although depressed general trade, and the caution of capitalists, investors, merchants, and consumers have greatly cramped our mining industry and our commerce in the superior metals that these interests have suffered less than most others, and if sanguine expectations cannot be encouraged reasonable hope, patience, and enterprise are still justified.

#### SOUTH WALES COAL.

A good deal of discussion has lately taken place in several of the Welsh ports, more especially Swansea, in reference to the shipment of Welsh coal, and the latter port has earned an unenviable notoriety for itself on account of the alleged mixture of inferior qualities with the justly celebrated Aberdare and Merthyr seams. This mixture is called "salad," and we are informed it has proved seriously detrimental to the interests of South Wales colliery proprietors in many of the principal French continental and foreign markets. Such being the case, it is satisfactory to know that the subject has been taken up in right earnest, with a view to the discontinuance of a practice which is not only seriously affecting the interests of the trade but is positively unjust. The whole subject was fully discussed at an influential meeting of the Swansea Chamber of Commerce last week. Mr. JAS. LIVINGSTONE (LIVINGSTONE and BRAUMONT, colliery proprietors and shippers), brought it forward in connection with a proposition as to the general trade of the port. He first traced the history of the port since the opening of the north and south docks, and showed that although the tonnage rates had gradually increased the coal trade had not been developed as rapidly as it ought to have done, nor in proportion to the increase in Cardiff and other Bristol Channel ports. The principal reason assigned by some for this comparative stagnation was the mixture of coals, and upon that subject many unwise and untruthful remarks had been said. He would in the out-cry say that the mixture of coal was not fraudulent unless the mixed coal was represented to be something which it was not; and in mixing coal the shipper was only doing his best, as a business man, for his customer.

There was a superabundance of anthracite coal in and around Swansea, which although admirably adapted for some purposes was not by itself at all adapted for consumption on board steamers. The Swansea coal was highly charged with carbon, and in order that this might burn well it was necessary that it should be mixed with bitumen, and he believed when properly and proportionately mixed

it produced the best coal which could be obtained. That was deemed selling an article for what it was not—supplying more or less than it was, but he challenged anyone to prove a single instance in which this had been done by a Swansea shipper. The mixture of coal, therefore, was not had in itself, and he did not see why Swansea should have such bad reputation in the coal ports when he unhesitatingly said that for every cargo of coal shipped in Swansea there were at least a dozen in Cardiff. What Swansea wanted was more dock accommodation and large heavy tonnage steamers, for which no adequate accommodation existed in the port. They were, however, about constructing new docks, and Mr. WOMAS, one of the largest coal shipper proprietors have stated their willingness to recommend ship-rangements had also been made by which the Aberdare and Merthyr coal could now be shipped in Swansea some 4d. or 5d. per ton cheaper than in Cardiff. Here a long discussion ensued, several of the principal merchants and shippers taking part, and it was suggested that the French and continental markets should be supplied with pamphlets, circulars, and maps giving full information of the Swansea coal fields, and the connection of the port with Aberdare and Merthyr colliery districts, and every other adopted to develop the mineral resources of the district. Plans of the new docks were then discussed, and the Harbour Trustees were requested to expedite the work as quickly as possible.

#### THE GREAT ENGLISH RAILWAYS.

In referring recently to the London and North-Western Railway we assigned it a foremost place among the railway systems of British Empire; and we even placed it in the very first rank, at the same time we must not forget the Great Western Railway with its chequered history, its vast ramifications, its huge cost, and its important traffic. The Great Western was at one time something of a plaything or counter in the hands of the late BRUNEL, who seemed to use it almost as much for the demonstration of his mechanical schemes as for the benefit of the holders whose capital had constructed it. But with the death of Mr. BRUNEL the broad gauge, as opposed to the narrow gauge, may be said to have succumbed. The Great Western emerged from the profitless isolation to which it had been reduced; and, upon whole, its fortunes have decidedly improved, in consequence, that the past half-year was not a very satisfactory period as regards the development of the traffic.

The Great Western now extends to Birkenhead in one direct line, and to Exeter in the other, while, with the help of the Cornish Company, its ramifications reach almost to the Land's End. It has also secured a footing in Ireland, and with the help of the state it has established continuous and systematic traffic relations to the Emerald Isle. It will, perhaps, excite some astonishment when we state that the Great Western system now virtually represents 228½ miles of lines, this imposing aggregate being made up as follows:—Lines owned by company, 115½ miles; lines leased, 113 miles; lines worked on lease, 100 miles; lines worked on contract, 98½ miles; and foreign lines worked over 120½ miles. It is, however, to note that 36½ miles of the system have only a passenger service at present, or, at any rate, are not in a state admitting the circulation of trains.

Even with this reservation, however, it will be seen that the Western Railway now represents very nearly 2250 miles of The revenue acquired on this very extensive network in the months ending July 31, 1877, was no less than 3,482,937*l*, and working expenses of the half-year having been 1,839,019*l*, the profits realised were 1,643,918*l*. A certain interest attaches, of course, to these imposing figures, but our business is rather with the technical aspects of the Great Western; and we proceed, therefore, to notice the fact that the Great Western Company expended in the past half-year 460,253*l* in the maintenance of way and works, number of miles maintained having been 2008½. This mileage made up as follows:—Broad gauge, 283½ miles; narrow gauge, 147½ miles; and mixed gauge, 253½ miles. Of the broad gauge mileage it should be added that 35½ miles were double line; of narrow gauge, 750½ miles; and of the mixed gauge, 205½ miles. Outlay made upon the maintenance and renewal of permanent properly so called was 353,262*l*, this total being made up of the following:—Wages, 127,372*l*; materials, 201,038*l*; steel rails, 20,000*l*; engine-power, 4852*l*. With regard to the item of 20,000*l* for rails, it should be explained that it represents the difference between the cost of steel and iron. The directors are debiting revenue 20,000*l* in each half-year under this head, a suspense account has been opened; at the close of July, 1877, a balance of 48,774*l* at the debit of this account, and it appears probable that some will elapse before the item finally disappears from the company's balance-sheets. The aggregate distance run by trains during the past six months was 12,700,264 miles—by passenger trains, 6,941 miles; and by goods and mineral trains, 6,759,324 miles. The outlay for locomotive power in the same period was 423,374*l*, and coke figuring in this sum for 84,350*l*.

#### THE MINES OF YORKSHIRE—ESTIMATED RENTAL AND RATEABLE VALUE.

From a Parliamentary Return just issued, showing the gross estimated rental and rateable value of the several coal, ironstone, and other mines in England and Wales, together with the mode of assessment, we find some very interesting information, especially as to the great difference in the assessment in different districts. Particular. The number of coal mines in England and Wales is stated to be 2688, with an aggregate gross rental (estimated) of 3,393,696*l*, and an aggregate rateable value of 2,776,920*l*. These items are obtained by various means, and whilst we may assume them to be tolerably correct, a reference to the rental and rateable purposes of collieries in Yorkshire will show that there must be in an exceptional position, for the rental of the collieries more than one-eighth of the whole of that put down for England and Wales, whilst the gross rateable value is nearly one-seventh. The following are the returns for the various districts, which show very differently they are rated per colliery, even where the seams of coal are worked:—

Coal mines.	Gross estimated rental.	Rateable value.
Barnsley .....	52 .....	210,478 .....
Bramley .....	10 .....	1,085 .....
Bradford .....	3 .....	1,145 .....
North Bierley .....	74 .....	16,834 .....
Dewsbury .....	61 .....	26,365 .....
Doncaster .....	2 .....	11,780 .....
Hallifax .....	24 .....	6 9 .....
Hemsworth .....	5 .....	3,148 .....
Holbeck .....	13 .....	2,248 .....
Huddersfield .....	1 .....	5,708 .....
Bunslet .....	12 .....	16,417 .....
Leeds .....	6 .....	6,374 .....
Pateley Bridge .....	2 .....	4,168 .....
Penistone .....	18 .....	39,820 .....
Pontefract .....	13 .....	76,677 .....
Rotherham .....	24 .....	10 .....
Sedburgh .....	1 .....	17,457 .....
Settle .....	1 .....	27 .....
Sheffield .....	5 .....	15,573 .....
Skipton .....	11 .....	77,976 .....
Tadcaster .....	1 .....	50 .....
Wakefield .....	41 .....	39,956 .....
Wharfedale .....	1 .....	2,914,501 .....
Wortley .....	29 .....	2,914,501 .....
Total .....	428 .....	2,479,691 .....

It will be seen from the above that the average rental of each colliery in the Barnsley district is about 2000*l*, in Sheffield 3500*l*, and in the Bradford district 1000*l*. The average rateable value of each colliery in the Barnsley district is about 1600*l*, in Sheffield 2500*l*, and in the Bradford district 800*l*. In those localities the beds of coal are tolerably uniform, and the measures are not very different, but in other instances being what is termed the Barnsley seam, or other hand we find that where the thin measures are worked the rental varies very much, and leaving out a few places where the



3,580  
 45,700  
 870  
 13,270  
 19  
 66,100  
 28,320

LLANARCH SILVER-LEAD MINING COMPANY, CARMARVON  
 — Some degree of interest has been created in the City through the probable introduction of the above mine. The owner—Mr. J. H. Williams—is well known in connection with the coal production of the district. One of his companies yielding 1000 tons per diem. His acquaintance with energy in mining pursuits are universally recognised. He is the Llanarch, it is an important feature to notice that the mine possesses the use and advantages of the Aber Llyd Lake. The water overfall is sufficient for all purposes, irrespective of the quantity required. Hence the cost of steam machinery is wholly dispensed with. Again, the deep adit level is of first importance, as it lays the mine out on a "back" from 750 to 1000 ft., requiring no further excavation. The owners of the Llanarch commence their operations with the purpose restricting them to the drivage of a series of day roads on the course of the several lodes, the configuration of the surface being highly favourable. It is computed that many

Messrs. Goodman, Swinburn, and Baylis (the retiring directors) were re-elected; Messrs. Carter and Carter were re-elected auditors.

busily engaged in the rolling of Bessemer rails, and it is said that



there are orders in hand that will take several months to clear out. The Coal Trade of South Yorkshire is slightly better than it has been, no doubt due to the change in the weather and the commencement of stocking for the winter by large consumers. A little more is being done with London in the best qualities of households, but there is not that demand to lead to any increase in price, for there is still a good deal of competition between the sea-borne and inland coal. Steam qualities go off very well, and there has been a marked increase in the quantity exported from Grimsby, as compared with the month of previous years. But this is not likely to continue many weeks longer, seeing that our colliery owners, looking forward to the closing of the Baltic, are sending as much away as they can. Gas nuts are moving off rather more rapidly, but there is not any notable alteration with respect to engine fuel.

The Wharfedale Colliery and the Dodworth Road, both close to Barnsley, are still standing, the former having lost the capital of the company, and the latter having been obliged to go into liquidation.

After being out for several weeks, the colliers belonging to the Dodworth Silkstone Colliery, near Barnsley, have agreed to have the matter in dispute put to arbitration. During the four months the men were on strike there were no actual deeds of violence committed, but there were threatening letters, in one of which the writers said, if the manager did not mind, "We shall watch you, and send a ball against your head when you are not aware."

At a meeting of miners' delegates, held at Barnsley, it was agreed not to entertain the proposal of the masters for a 5 per cent. reduction. Some of those present thought as trade was improving their employers should give them the 6 per cent. they last year took off their wages. What decision the masters will come to will no doubt be made known in the course of a few days.

#### TRADE OF THE TYNE AND WEAR.

Sept. 5.—The Coal Trade has been very quiet during the past week, but shipments of good steam, gas, and house coals have been fair. Now that the masters in Northumberland have failed in getting a reduction in miners' wages they are turning their attention more to the question of round and small coals, and it is very probable that a portion at least of these coals will be left underground, but the men ought for the benefit of all parties to produce as much round coal as possible.

The Scumerson Coal Company have succeeded in finding a new coal seam near Berwick; the shaft has been two years in sinking, and the depth is 140 yards from surface. The coal is of excellent quality, and it is intended to ship it in the new dock at Berwick. This ancient border town has been a sort of sleepy hollow for a long period, but the formation of these docks, and the opening out of the coal seams which abound in the vicinity, will materially improve the trade of the town and district. A serious accident occurred at the Seaton Barn Colliery on Tuesday, and two men were suffocated. One of the ropes broke, and the cage fell down the shaft. Several men were employed in repairing the damage, and they were in a drift near the up-cast shaft; it is supposed that they were suffocated by the fumes from the underground furnace. At Bearpark a large new coking colliery, lately described in the Journal, opened by W. G. B. Forster and others, two miles south of Durham, a dispute took place a few weeks ago respecting a local reduction made in the prices of the hewers, and as the men strongly objected to this reduction it was agreed to refer the matter to arbitration, and as the men appointed could not agree Mr. Hepple, of Brandon, was nominated umpire, and he made his award, but in spite of this the men stood out and refused to accept the reduction, and last week after due notice the men were ejected from their houses, which belong to the owners. It is stated that a large number of men are ready to take the places of the men on strike. A number of the Ryhope men were brought before the Sunderland magistrates on Saturday charged with absenting themselves from work without having given due notice. The counsel for the men admitted that the strike was unjustifiable, and asked for an adjournment of the case for a week, intimating at the same time that if that was conceded his opinion was that an amicable arrangement between the parties would be made in the meantime. After some discussion this course was ultimately adopted.

**NEW INSTRUMENT FOR UNDERGROUND LEVELLING.**—At a meeting of the Institute of Mining and Mechanical Engineers, in the Wood Memorial Hall, Newcastle, on Saturday, a paper, by Messrs. T. Lindsay Galloway, M.A., and C. Z. Bunning, was read "On a New Instrument for Levelling Underground." The general principle of the instrument was brought under the notice of the writers by the system adopted by Dr. Luigi Aita in taking the levels for sanitary works in Padua. They have found reason, however, while retaining the general principle of Dr. Aita's instrument, to make several improvements in its construction, and an important change in the mode of applying it. The apparatus consists essentially of two glass tubes connected together by an india-rubber pipe, which may be of any convenient length—say, of 10 yards upwards. Each glass tube is attached to a suitable scale, upon which are marked subdivisions, in the same manner as upon the ordinary levelling staff. The tubes are filled up to about the centre of each scale, with water coloured so as to render it more distinctly visible. If now the scales be held vertically upon any sloping or uneven surface, and at any distance apart that the length of the india-rubber pipe will admit of, the difference of the readings denoting the position of the coloured liquid in each tube will represent the difference of height between the stations at which the scales are held. In the instrument exhibited the length of the glass tubes was 3 ft., and of the india-rubber connection 12 yds. This instrument had been specially constructed to meet the requirements of low workings in mines, but longer scales and tubes might be employed with advantage, either in surface levelling or in mines where the workings are high. In thus adopting long glass tubes, and attaching them permanently to the scales, the writers found it advisable to depart considerably from the form of apparatus used by Dr. Aita. The glass tubes in the Aita level are only a few inches in length, and are moveable upon the scales being attached by means of a sliding frame, which can be raised or lowered at pleasure. Instead, however, of the liquid, as in the present apparatus, simply finding its own level in the tubes, the tubes themselves are shifted in the Aita instrument so as to suit the level of the liquid. The apparatus in its present form, besides being more simple, is necessarily quicker in its action in adjustment of any sort being required before reading. In order to expedite its use still further a short piece of tube of small diameter has been placed near one end of the india-rubber hose, which resists the oscillations of the liquid, and at each observation brings it rapidly to rest. By this means a levelling can be made almost as quickly as the apparatus can be moved from station to station, and many sights may be readily taken during the time which would be spent in simply getting up the telescope level and adjusting the plate screws and focus. On the motion of Mr. Bewicke, Haydon Bridge, seconded by Mr. Ramsay, Sherborn Tower, a vote of thanks to Messrs. Galloway and Bunning was carried by acclamation.

#### REPORT FROM CORNWALL.

It is expected that Prof. Bell's extraordinary invention—the telephone—will be put to a practical use in our Cornish mines, in the way of communicating from the surface to the men working in the deep cuttings underground. At any rate, experiments in view of this benefit have been made, mainly through the exertions of Mr. Arthur Le Neve Foster, brother of Dr. C. Le Neve Foster, Government Inspector of Mines for the West of England. Already in large coal mines either the electric telegraph or speaking tubes have been laid, but the former is attended with some difficulty in learning, and the latter is of no use at a great distance, the friction making the sounds indistinct, while both would be confounded on the score of cost. The telephone, however, presents no such disadvantages. All that has to be conveyed to any part of the mine is an insulated wire cased in india-rubber, through which the sound of the voice can be conveyed, for, whilst the speaking tube conveys vibrations of air direct, by means of the telephone vibrations of air are altered into vibrations of electricity, which again become vibrations of air on reaching the other end of the instrument. By these means the sounds produced are much more distinct, and can be carried a far greater distance than by the speaking tube. The experiments to which we now refer have taken place in the presence of a large number of gentlemen at West Eliza Mine. The wire was taken

down the main shaft of the mine, and was carried down into the workings by Mr. Foster in the roughest possible way. It was fastened in the 42 ft. level to the air pipes, and the whole time occupied in making the arrangements and commencing conversation was 15 minutes. The results were more than could be expected. Every word from below was plain and clear—songs, and even whistles, were distinctly heard, and, on being questioned by Mr. Foster from above, those below replied that they could hear the whistle of an engine on the line. The wire was cut in the mine, and two persons joined hands in keeping up the connection between the main piece and the end. These gentlemen constituted the conducting medium for the electricity, and the conversations were as plain after the severance as before. The experiments were most successful throughout, and it was the general opinion that the telephone could be made an instrument of great benefit and facility in the working of our mines.

I regret to notice that at West Poldice account, when Mr. R. R. Broad expressed the delight the meeting felt at seeing Sir F. M. Williams again among them after his recent serious accident, Sir Frederick, while expressing thanks for his recovery, said he felt he should never again be the man that he was before that accident. Many of us would be very sorry if that should be the case, as Sir Frederick is a kind-hearted gentleman, desirous of supporting the mining interest, and of doing good to those around him in various ways. No political considerations have a place under such circumstances. When the unfortunate accident occurred to Sir Frederick, no persons were more sorry than many of those who are not of his views in political matters.

McKean's boring machines are to be immediately set up in South Roskear Mine, Camborne, for the purpose of both sinking and driving, and great results are expected. Three rival boring machines will thus shortly be at work—The Barrow at Dolcoath and South Crofty, the Beaumont at Carn Brea, and the McKean at South Roskear.

In these days of depression it is a good sight to see new engine-houses building and shafts sinking. This can be seen at Roscudine Mine, near St. Austell, where Capt. Williams, C.E., of Wheal Eliza Mine, is erecting extensive machinery for working the Old Boscudine sets, situated in close proximity to the famous Wheal Eliza tin mine. It would be a great pleasure to see many more bays being proceeded with equal promises of success.

The statement that Mr. Bailey has signified his intention of getting rid of his interest in Cook's Kitchen is entirely without foundation. Mr. Bailey being the largest shareholder in a call-making mine, his withdrawing from the concern at this time would have a disastrous effect. It should be added that a balance-sheet has always been laid before the adventurers at the mines under the purview of Messrs. Pike and Son.

The dressing cost at Wheal Eliza is reduced to 22s. or 23s. a ton per month. Mr. R. H. Williams, C.E., is about to patent a buddle, by the use of which a shovel will not be required for the tinstuff from the time it leaves the bottom until it is in the calisher.

**TINCROFT AND CARN BREA MINES.**—"A Shareholder" writes:—I am very pleased to learn that at Tincroft, on Friday, Capt. Teague still retains as large an interest in the mines as he has held for many years—considerably over 2000 shares. There are three other large shareholders, who hold respectively 300, 200, and 200 shares, so that these four shareholders actually hold one-half of the mine, which is divided into 6000 shares. Five shareholders hold from 100 to 200 shares each, and 18 shareholders 20 shares each and above. There are altogether 410 shareholders.—At Carn Brea also Capt. Teague holds about 230 shares, and other large adventurers hold 62, 51, and 45 respectively. Seven shareholders own from 20 to 30 shares each, and six 10 shares each and above. There are altogether 175 shareholders here.

Tincroft has a balance against the mine of 15,593l.—The Chairman said that from April, 1863, when they brought the books of the Tincroft Mining Company into Cornwall, they had paid in dividends 232,580l., which added to the 28,500l. which was paid in dividends when the mine was held in scrip, made up 261,080l. This was the only break since that time, and he was obliged to ask them to keep a dividend in abeyance.—A committee was appointed to wait on Lord Roberts, with the view of obtaining assistance towards defraying the cost of supplying a boring-machine to the mine, which the chairman estimated to cost 3000l.

Carn Brea has a balance of 26,000l.—The balance at the last account amounted to 2177l., raising the total liabilities to 28,200l.—The Chairman explained that against this amount they had 300 tons of tin lying in the stopes and passing through their hands, which, at the prices of the day, would fetch 11,250l., while, copper ore that would be sampled for next Thursday, was worth 300l. The machinery and plant he valued at 20,000l., so that their assets might be considered at something like 31,550l.; therefore, were the mine wound up at once, they would have 3349 surplus. Although the balance was large, the chairman said he did not feel called upon to issue a notice empowering him to make a call. Wheal Pever has a loss of 51l.—The Chairman thought it a very satisfactory statement of accounts, and Mr. Chellver observed that there had been an actual profit of 350l.—Mr. Rule asked what the total liabilities of the mine were?—The Chairman said that the powerful machinery and dressing appliances had been erected during the past year at a cost of 2600l., of which 1200l. had been paid, leaving 1400l. now due. Against that they might, if they chose, credit 500l. at least for tin on the floors, the cost of rising which had been paid.—A discussion ensued, and it was ultimately agreed that they should raise all the tin they could, selling enough to pay working costs, and stocking the remainder.—Mr. Rule proposed that a call should be paid to wipe off the whole of the mine's liabilities; but, after a long discussion, the motion was withdrawn.

#### STEAM-ENGINES.

In compound steam-engines, as they are usually constructed, the pistons of the high and the low pressure cylinders are either rigidly connected together or are connected to one crank shaft, so that the one is compelled to move at a speed corresponding to that of the other, and thus the acting pressures are determined independently of the work performed by each piston. One part of the invention recently patented by Mr. HENRY DAVY, of Leeds, relates to an arrangement of compound pumping-engines, such that each piston can move independently of the other at a speed determined by the relation between the pressure acting on it and the work performed by it, and by this arrangement he obtains the additional advantage of duplication, having two separate engines, either of which can be worked alone while the other is under repair. For this purpose he constructs two complete pumping-engines, each working its own pump or pumps, their steam cylinders being either both of the same size, or the one being larger than the other, as circumstances require, and by preference he places the cylinders near one another, side by side. He provides two steam reservoirs, preferably the first in the form of an annular cylinder surrounding and enclosing the second, which is cylindrical; and from the outer to the inner reservoir he provides a passage fitted with a valve loaded so as to open only when the pressure within the second reservoir is less than that within the first by an amount equivalent to the load on the valve. The first or outer reservoir is supplied with high-pressure steam from a boiler, and supplies the smaller or high-pressure cylinder, the exhaust from which is led into the second or inner reservoir. From the latter the larger or low-pressure cylinder is supplied, and the exhaust from this cylinder is led into a condenser or into the atmosphere. There is a passage by which the exhaust from the high-pressure cylinder can be led into the condenser, and the various pipes and passages are provided with shut off valves, some of which may be of compound form, closing one of the communications when they open another. Each cylinder may have in line with it an air pump worked direct from its piston, or there may be a separate air pump worked by an auxiliary engine, or a pair of air pumps so worked when the duplication of parts is required to be complete.

When the engines are in their ordinary working condition, both cylinders being in use, steam at or near boiler pressure flows from the first reservoir to supply the high-pressure cylinder in which it works, either at full pressure the stroke or expansively to the extent determined by the adjustment of the valve gear, the exhaust from this cylinder flows into the second reservoir and thence to supply the low-pressure cylinder, the exhaust from which flows to the condenser or into the atmosphere. Should the load or pressure on either piston vary, its speed will vary independently of the other piston, which will nevertheless be influenced by it so as to bring the two motions nearly to accord. Thus, if the high-pressure piston should gain or lose speed, it will supply more or less exhaust steam to work the low-pressure piston, and if the latter should gain or lose speed it will accelerate or retard the high pressure piston by diminishing or augmenting the back pressure thereon.

By closing the supply and discharge valves of the low-pressure cylinder, and leading the high-pressure exhaust into the condenser or into the atmosphere, the high-pressure cylinder can be worked alone; and, again, by closing the supply and exhaust valves of the high-pressure cylinder the low-pressure engine can be worked alone, being supplied with steam which cannot have higher pressure than that in the second reservoir as determined by the load on the valve of its supply. When the boiler is near the engine the first reservoir may be dispensed with, or it may merely constitute a steam jacket to the second reservoir for the purpose of sustaining the heat of the steam discharged from the high pressure cylinder. Instead of arranging the one engine to work always as the high-pressure, and the other always as a low-pressure engine, they may be so arranged that both may be used either as the high-pressure or as the low-pressure engine, as may be required. For this purpose both steam cylinders may be of the same size, and each engine is provided with a separate communication with the high-pressure reservoir, provided with a stop valve.

Between the two engines is a chamber from which lead pipes communicating firstly with the low-pressure reservoir, secondly with the valve chest of each engine, and thirdly with the exhaust port of each engine. The several passages leading to the two engines are provided with slides or valves that can be moved by hand, whereby,

according as the one or the other engine is to work as the high-pressure engine, the communication between the said chambers and the valve chest of this engine is closed (the communication between the latter and the high-pressure reservoir being opened), and the communication with the exhaust is opened while the reverse communication is established with regard to the other engine, thus enabling it to work with the exhaust steam of the first-named engine; or both worked as high-pressure or as low pressure engines, they may be constructed as above described may directly work pumps in levers, bell cranks, or other connections suited to the relative positions of the cylinders and pumps.

#### TREATING FERRUGINOUS SANDS.

It is well known that there are certain iron ores and residues of iron which from their being in a state of minute division it has hitherto been found very difficult to smelt or otherwise treat. Amongst ores or oxides of the class referred to are the iron sands of Taranaki and Canada, some hematite ores, and what is known as "purple ore," the last named being a residuum of what is known as the "wet" process of treating iron and copper pyrites. To overcome these difficulties Mr. ROBERT MAIN, of the Carnbroe Ironworks, Coatbridge, has patented an invention which consists in mixing ores or oxides of the kind referred to with blackband or claystone, or other ironstone, and in calcining the mixture in the manner usually practised with the ironstone alone, or in any other suitable manner, prior to putting it into the blast-furnace.

In carrying out the invention when adopting the ordinary heap or open hearth method of calcining the ironstone a suitable proportion of the finely divided iron ore or oxide is roughly mixed with the ironstone and with the necessary proportion of coal, the case of clayband ironstone calcined on the open hearth the portions found convenient in practice are one hutch of the fine ore or oxide for every six hutches of the ironstone. In the case of band ironstone calcined in running kilns there should be one hutch of the fine ore or oxide for every 20 of the ironstone. In the case of blackband and ironstone calcined on the open hearth there should be one hutch of the fine ore or oxide for every 3 or 4 of the ironstone. In most cases the proportion of coal to the total iron should be increased to an extent that is easily ascertained on trial. The mixture may be sufficiently effected by scattering the fine ore or oxide on the ironstone with spades or shovels, the contents of the heap being deposited in regular order, according to the proportions above being raised to a high temperature becomes agglutinated and formed into lumps suitable for charging along with the calcined ironstone into the smelting furnace. By the process described the purple or similar oxide becomes freed from the large percentage of waste usually adhering to it, and much of the sulphur, arsenic, and other associated with it is volatilised, so that the quality of the iron obtained is improved.

#### GENERATING ELECTRICITY AND MOTIVE POWER.

In ordinary galvanic batteries the electric current results from the chemical action of a liquid acid upon a metal, but according to the invention of Mr. PAUL JABLOCHOFF, of Paris, whose name has recently been mentioned in the Mining Journal in connection with an improved electric light, the current is produced by the action upon carbon of a solid body in a state of fusion. Instead of taking a metal for the negative electrode of a battery—that is, the electrode which is consumed in the action—he takes coke or an artificial glomerate of carbonaceous matter possessing the same qualities, acts upon this electrode by means of nitrate of potash or of soda of ammonia in a state of fusion. He prefers to employ the nitrate of soda on account of its cheapness.

The carbonaceous matter is acted upon by the molten nitrate in the same manner as zinc is acted upon by the different acids or in the ordinary batteries. As the second electrode, he places the same liquid either platinum or other metals that are not acted upon by the liquid in the presence of carbon. The crucible in which the nitrate is fused, may constitute the positive electrode. For introducing the carbon into the liquid, the former may be attached to it a metal rod which serves for attachment of the conducting wires, or he places a metal grating or perforated receptacle in the liquid in which the carbon is contained, such receptacle being insulated from the crucible if this constitutes the second electrode. In the latter arrangement the carbon is added from time to time, as in a furnace, in proportion to the consumed.

For bringing the battery into action in the first instance, nitrates may either be fused in advance in the crucible, and the carbon be then introduced, or the nitrate may be placed in the crucible in a pulverulent state, and the carbon be ignited and placed into the nitrate, which will become fused thereby. While the battery is in operation, large quantities of gases are developed in their nature to those produced by the combustion of gunpowder. These gases, collected by any suitable arrangement, as for instance in a boiler or closed chamber, may be utilized as motive power, that my improved battery serves as a source both of electricity and of motive power. By mixing various metallic salts with the nitrate the double effect may be obtained of regulating the intensity of action of the battery, and of obtaining metallic deposits upon the positive electrode, as in the ordinary electro-plating process.

According to one arrangement of batteries, constructed according to this invention, the crucible containing the nitrate and carbon forms the positive electrode, the carbon being suspended in the liquid nitrate in a wire-gauze cylinder attached to a cross bar, the ends of which rest upon a ring of insulating material on the sides of the crucible. The latter is closed in by a hinged cover having an aperture, to which is connected a pipe for conveying the gases, and which is connected to a boiler or other apparatus, as required. According to another arrangement the crucible is made of earthenware, glass, or other suitable metallic substance, centrally within which is placed the wire-gauze cylinder containing the carbon, and surrounding this is a cylinder constituting the positive electrode, or this may consist of a rod or bar of metal. If it be desired to employ the battery principally or entirely for utilising the gases generated as motive power, the crucible or vessel containing the nitrate and carbon is closed at top, and is provided with a pipe leading to a boiler or closed vessel for collecting the gases under any desired pressure. The top or dome of the crucible may in this, as also in the other arrangements, be provided with a hopper by a valve, through which carbonaceous matter may be introduced from time to time, and with a second hopper for the addition of nitrate when required.

**NORTH CORNWALL.**—Arrangements are now in progress in accordance with the directors' report recently issued; and it is considered highly probable that the mine will be in a profitable position within a comparatively short space of time.

#### TO COALMASTERS.

**WANTED, TO PURCHASE OR LEASE, A GOING COLLIERY** favourably situated. Particulars, from principals only, to H. and A. KIRKWOOD, 175, West Street, Glasgow.

**WATER-WHEEL WANTED,** from 50 to 60 feet in diameter, with 34 or 4 feet breast, with wrought or cast-iron axle, segments, and 30 fathoms of 7 inch diameter PUMPS, with 6 inch diameter WINDBORE, DOOR-PIECE, and WINDING BARREL. Address, PHILIP HAWKE, The Islay Silver-lead Mines, Islay, Scotland.

**THE ADVERTISER,** who has studied in Freiberg, Saxony, his SERVICES as SUB-MANAGER or ASSAYER at a LEAD WORKS. Two years' experience in Copper and five in Lead Works. Address, "T. C. S.," Belvoir-terrace, Swansea.

**COPPER MINING PROPERTY FOR SALE IN CANADA** close to shipping navigation. Full particulars by applying personally to A. J. DE PATIGNY, No. 1, St. Helen's, E.C.



SEPT. 8, 1877.]

## NATIONAL ASSOCIATION OF COLLIERY MANAGERS.

The Promoters of this Association desire all willing to assist in the formation, to MEET THEM at the TREVELYON HOTEL, Corporation-street, MANCHESTER, on SATURDAY, 15th inst., at 3.50 P.M.

## QUARRY IN WALES FOR SALE BY PRIVATE BARGAIN.

THE NORTHERN WELSH COMPANY'S QUARRY, "CHARNEL FAWR," situated near CARNARVON, in the centre of the slate range, at present in full operation, producing excellent slate comprising ONE HUNDRED AND TWENTY-FOUR ACRES, leased from the Government at a moderate royalty.

Apply to MOORE and BROWN, C.A., No. 165, St. Vincent-street, Manchester.

## GREAT AND PROFITABLE INVESTMENT.

CHINA-CLAY WORKS, ST. AUGUSTINE. The works would secure half-share, and might be paid for by instalments. The works have been expended in the purchase of the lease, developing the china-clay, plant, &c. Sole object of further capital is to complete the work and carry on the business.

Apply to HAY and Co., 55, Cheapside, London, E.C.

## PARTNERSHIP—SAFE AND PROFITABLE INVESTMENT.

Three Gentlemen, who have for upwards of three years been engaged in the most VALUABLE MANGANESE PROPERTIES (West of England) have THREE of these FULLY DEVELOPED, showing extensive lodes of manganese, requiring only additional capital and labour to raise on a large scale, and to market.

For purpose of a HALF-SHARE in these properties is OFFERED TO ONE OF GENTLEMEN, on moderate and advantageous terms. The properties have recently inspected and most favourably reported on by independent persons, and are open to the strictest investigation.

Particulars of Mr. GOODWIN, 5, Air-street, Piccadilly, London.

## GERMAN MINING ENGINEER, of great Practical

Experience, understanding some English, and fully conversant with the German and Spanish languages, SEEKS a SUITABLE ENGAGEMENT. Would be glad, where he could point out Rich Lead Ore Mines to enterprising persons.

"G. & Co. 791," care of Messrs. Haasenstein and Vogler, Frankfurt-on-Main.

## ENGLISHMAN, late Manager of Mines, holding several

Government Certificates, DESIRES EMPLOYMENT. Well acquainted with English and Spanish languages. Good French and Spanish scholar. Correspondence, Assayer, and Accountant.

"Madrid," MINING JOURNAL Office, 26, Fleet-street, E.C.

## NOTICE.—ROYAL SCHOOL OF MINES,

JERMYN STREET, LONDON. TWENTY-SEVENTH SESSION will BEGIN on MONDAY, the 1st of September. Prospectuses may be had on application.

## TRENHAM REEKS, Registrar.

## GLASGOW AND THE HIGHLANDS.

ROYAL ROUTE VIA CRINAN AND CALEDONIAN CANALS, BY ROYAL MAIL STEAMER, "IONA," DAILY, at Seven A.M., and at Nine A.M.

With map and tourist fares, free, at Messrs. CHATTO and WINDUS, Publishers, 10, Pall Mall, London; or by post from DAVID HUTCHESON and Co., Glasgow.

## W. F. LOWE, F.C.S.,

Associate of the Royal School of Mines, ASSAYER AND ANALYTICAL CHEMIST

ASSAYS AND ANALYSES MADE OF ORES, FIRE-CLAYS, LIMESTONES, &c.

ADDRESS.—ASSAY OFFICE, CHESTER.

## FLETCHER-PAGEN, C.E., F.G.S.,

CHAPEL HEYS, BODMIN, AND

ST. AUSTELL, CORNWALL.

MAKES THE DEVELOPMENT AND GENERAL SUPERVISION OF MINES AND CHINA-CLAY WORKS, and the ERECTION OF MINING MACHINERY AND PLANT.

REFERENCES TO WORKS COMPLETED, AND IN PROGRESS.

## T. R. GLOVER,

MINING DEALER AND BROKER AND GENERAL FINANCIAL AGENT

2, EXCHANGE STREET EAST, LIVERPOOL.

## Mr. E. JACKSON,

Associate of the Royal School of Mines, ANALYST AND ASSAYER.

Complete Analyses made of Copper, Silver, Lead, Zinc, Tin, and ASSAYING TAUGHT.

104, QUEEN VICTORIA STREET, LONDON, E.C.

## EMMENS AND CO. (LIMITED),

MINING ENGINEERS AND MANUFACTURING CHEMISTS.

CHIEF OFFICE, BISHOPSGATE STREET, LONDON, E.C.

PRINCIPAL WORKS, BISHOPSGATE STREET, LONDON, E.C.

MANAGEMENT OF Mines and Chemical Works and the London Agencies of Mining Engineers and Manufacturers.

Technical Reports and Surveys of every kind made.

MANAGING DIRECTOR—DR. STEPHEN H. EMMENS.

## MINING ON THE PACIFIC COAST.

JOSEPH RICHARDS, MINING ENGINEER, of Devon Great Consols and other Mines, and Mineral

of the Pacific Coast, may be consulted respecting all MINES OF THE PACIFIC COAST.

MINES INSPECTED, REPORTS FURNISHED, &c.

JOSEPH RICHARDS, M.E., Battle Mountain, Nevada,

MEXICO, NEW MEXICO, ARIZONA, UTAH, NEVADA,

AND CALIFORNIA.

## F. M. F. CAZIN,

MINING AND CIVIL ENGINEER,

AT BERNALILLO, NEW MEXICO, U.S. OF AMERICA.

Business and Law, offers his services at moderate charges for Reporting and other Property in any of the above-named States or Territories;

and, and responsible advice as to securing full titles and possession;

and mode of utilizing the property, will assist in settling existing difficulties;

and in disposing of developed mining property when held by others.

As to securing title to undeveloped mining properties at present, April 1, 1876, containing report on property of the Maxwell Land

Railway Company; as to technical standing, to the prominent men of the Mining Journal of Aug. 30 and Nov. 31, 1873, and New York

Miner, Feb. 28, 1874.

## W. TREGELLAS, 122, BISHOPSGATE STREET

WITHIN, E.C.,

DEALERS IN all descriptions of Stocks and Shares at close market prices.

## HARRALD AND CO., STOCK AND SHARE

DEALERS, 39, GREAT ST. HELEN'S, BISHOPSGATE STREET

WITHIN, LONDON, E.C.

## THORNYCROFT AND CO

FINANCIAL AGENTS AND SHARE BROKERS,

51 SOUTH JOHN STREET, LIVERPOOL.

## R. J. MERRY,

ASSAYER AND ANALYTICAL CHEMIST,

SWANSEA.

## J. TAYLOR AND CO.,

MINING ENGINEERS AND INSPECTORS,

10, LONDON WALL, LONDON, E.C.,

England, Scotland, Wales, and on the Continent.

## VALUABLE MINING PROPERTY IN COUNTY ANTRIM.

MESSRS. CASSON AND CHAMLEY WILL SELL, BY PUBLIC AUCTION, at the Furness Abbey Hotel, Barrow-in-Furness, in the county of Lancaster, on Tuesday, the 11th day of September, 1877, at Two o'clock in the afternoon, by the Order of the Representatives of the late JAMES FISHER, Esq., and without reserve, all that well-known MINING PROPERTY, situate in GLENRAVIL COUNTY ANTRIM, and known as the

## GLENRAVIL MINES.

Held under lease dated the 23rd day of November, 1871, for the term of 31 years, from the 1st day of August, 1871, at the yearly dead rent of £400, without any other payment to the lessor, and comprising 800 acres, more or less.

The mine has been in active operation since 1866, the present and average shipment per year being about 20,000 tons.

The quality of the ore is excellent, averaging from 42 to 50 per cent. of metallic iron, and containing a large percentage of alumina.

With the exception of a very small portion, the whole of the ground comprised in the lease is one ground, and is computed to contain about 7000 tons of ore per acre.

The profitable working can be vastly increased on the revival of trade. There is a tramway connecting the mines with the Ballymena, Cushendall, and Red Bay Railway, and with the county road from Ballymena to Red Bay, thus affording facilities for shipment of the ore both from Belfast and Red Bay.

The mine is in full operation, and will be sold with the tramway, horses, and all working plant, and a stock of about 8000 tons at the pit's mouth as a full going concern.

There are a number of unexpired contracts at remunerative prices which will be handed over to the purchasers.

The Manager will show the Works; and further particulars can be had on application to Messrs. JAMES FISHER and SONS, Barrow-in-Furness; to Mr. JOHN FISHER, Glenravil House, Ballymena; to the Auctioneer, Ulverston and Barrow-in-Furness; to Messrs. CHESTER, URQUHART, MATTHEW, and HOLDEN, Solicitors, 11, Staple Inn, Holborn; and R. B. D. BRADSHAW, Solicitor, Barrow-in-Furness.

## WITHOUT RESERVE.

IN RE THE CATHERINE AND JANE LEAD MINING COMPANY (LIMITED). IN LIQUIDATION.

LEAD MINE, together with the complete MACHINERY and PLANT.

MR. FRANK LEWIS (of the Firm of Messrs. FRANK LEWIS and KEMP) WILL SELL, BY AUCTION, pursuant to an Order of the Chancery Division of the High Court of Justice, at the Mart, Tokenhouse-yard, London, E.C., on Friday, September 14th, 1877, at Two o'clock precisely, the MINE known as the

## CATHERINE AND JANE LEAD MINE,

Situate near the village and railway station of Penryn Dendrecht, in the county of Merioneth, held under a lease from the freeholder for a term of 21 years, from the 1st March, 1875, at a royalty of 1-15th, and a dead rent of £20, merging into the royalty; together with the PLANT, MACHINERY, and EFFECTS for working the same.

The set is about one and a half mile in length and one and a half mile in width, and is ready for immediate working, large sums of money having been laid out upon it and the machinery. The latter being in capital working order.

Particulars and conditions of sale may be had at the Mart; of Messrs. WATSON, SONS, and ROSE, Solicitors, 13, Bouverie-street, Fleet-street, E.C.; of J. D. GOVER, Esq., Solicitor, 2, King-street, Cheapside, E.C.; of P. M. EVANS, Esq. (Messrs. Evans and Peiron), Official Liquidator, 2, Gresham Buildings, Basinghall-street, E.C.; and of Messrs. FRANK LEWIS and KEMP, Auctioneers, &c., 26, Gresham-street, London, E.C.

## MESSRS. GLOVER AND STEWARD WILL SELL, BY

PUBLIC AUCTION, at the Liver Hotel, Chester, on Wednesday, the 13th September, at Twelve o'clock,

## THE EGLWYSEG EXTENSION SILVER-LEAD MINE,

About five miles north of Llangollen, on the west side of Minera Mountain, and MATERIALS, in One Lot.

The MATERIALS consist of Iron Rails, Wagons, Miners' Tools, &c.

Mr. Thomas Davies, on the mine, will show the mine and maps.

Further particulars by applying to Mr. DYER, Amlwch, North Wales.

## VALUABLE MINING SETTS, MACHINERY, AND PLANT,

## IN UNY LELANT, CORNWALL—FOR SALE.

MR. A. BERRYMAN has been instructed to OFFER FOR SALE, BY AUCTION, on the Mine, on Monday, the 17th September next, at noon, as a going concern, the WHOLE of the VALUABLE and EXTENSIVE MINING SETTS, called

## THE PROVIDENCE MINES,

Situate in the parish of Uny Lelant, in the county of Cornwall, together with the whole of the EXCELLENT PLANT and MACHINERY thereon, including—

ONE 40 in. PUMPING ENGINE, 9 ft. stroke, with TWO 11 ton BOILERS and FITTINGS.

ONE 30 in. STAMPING ENGINE, 9 ft. and 5 ft. stroke, with TWO BOILERS, 19 tons, two fly wheels and wrought iron shafts, three stamps' axles for forty-eight heads, with heads, lifters, &c.

ONE 25 in. WINDING ENGINE, double acting, 6 ft. stroke, with TWO BOILERS, 10 tons and 8 tons, and WHIM CAGE.

ONE 20 in. MAIN ENGINE, double acting, 6 ft. stroke, one fly wheel, two wrought iron shafts, and ONE 8 ton BOILER and FITTINGS, balance bob, &c.

ONE heavy 10 ft. diameter TOOTH WHEEL, with wrought iron shaft plunger, blocks, and brasses.

ONE 8 in. HORIZONTAL ENGINE, 30 in. stroke.

BALANCE BOB at engine, with connecting rod, &c., complete.

## ALSO,

## ALL THE EXTENSIVE PLANT, MATERIAL, GEAR,

## AND MACHINERY,

Particularised in an inventory thereof, which may be seen on the mine.

Also, the RICH TIN LEAVINGS throughout the mine, being the accumulation of many years, during the greater part of which this has been one of the largest tin-producing mines in the county. The sets, which have about fifteen years to run, are held upon favourable terms, are large in area, and comprise rich and productive mineral ground. The water charges are remarkably easy, and the mine is most favourably situated for the supply of material.

The mines have sold since 1832, the commencement of the present adventure, about £553,000 worth of tin and about £58,000 worth of copper ore. They have also paid during the same period the large sum of £113,820 in dividends, against about £23,000 total calls. Coupling these circumstances with the fact that a large proportion of the ground included in the sets remains unexplored, a favourable opportunity is now offered for mining investment.

For further information and to view, apply to Capt. HOLLOW, the Manager on the mine; Mr. EDWARD TRYTHALL, the Purser, Penzance; or to the Auctioneer, 28, Clarence-street, Penzance.—Dated 23rd August, 1877.

## MINING SETTS, MACHINERY, AND PLANT,

## IN ST. JUST (IN PENWITH), CORNWALL, FOR SALE.

MR. A. BERRYMAN has been instructed to OFFER FOR SALE, BY AUCTION, on the Mine, on Monday, the 24th September next, at noon, as a going concern, all that Mining Adventure called

## SPEARNOOR

(Including SPEARN CONSOLS, with which it has recently been amalgamated).

Situate in the parish of ST. JUST (IN PENWITH), CORNWALL, comprising the SEVERAL SETTS and all the excellent PLANT and MACHINERY thereon, viz.:

ONE 30 in. cylinder STAMPING ENGINE, with new nozzles, two 12 head stamps' axles and lifters, one balance bob, and one good 10 ton BOILER.

ONE 24 in. cylinder WHIM ENGINE in good condition, WHIM CAGE, and an excellent BOILER, 9 tons.

ONE 25 in. cylinder (new) PUMPING ENGINE, with balance bob, and one 8 ton BOILER.

ONE 18 in. cylinder WHIM ENGINE, with whim cage, rope, &c., and one 4½ ton BOILER.

Several tons of tramroad iron, iron pumps, and sundry lots of other iron. A large quantity of wood supports; ditto in tramroads, &c.; wood roofing; dressing tools, &c.

Also, all the TIN LEAVINGS throughout the mine.

The sets have about 13 years to expire, and the mine is favourably situated, lying between Botallack and Levant Mines, and much of the ground included in the sets remains unexplored.

For further information and to view, apply to Capt. BENNETTS, the Manager, on the mine; Mr. EDWARD TRYTHALL, the Purser, Penzance; or to the Auctioneer, 28, Clarence-street, Penzance.

Dated 30th August, 1877.

## PRELIMINARY ANNOUNCEMENT.

ON THURSDAY, 20TH SEPTEMBER, at COPPER MINES, GOUROCK, AT TWELVE NOON.

SALE OF HORIZONTAL STEAM ENGINE, CRUSHING MILL, TWO SETS

ELEVATORS; GEARING; DRIVING PULLEYS, &c., &c.; FINE AND

COARSE SIEVES; WASHING MACHINE; JIGGER MACHINERY;

WATER WHEEL; CRUSHING ROLLERS; WINDING DRUM; SPUR

AND BEVEL WHEELS; QUANTITY OF SCRAP IRON; SMITH'S ANVIL;

BELLOWS; GRINDSTONE; CRAB WINCH; WOODWORK OF OFFICE

AND SMITHY, &c.; also, PIT HEAD FRAMING, fresh and suitable for re-erection (sold in consequence of the stoppage of the Mines).

## MESSRS. HUTCHISON AND DIXON have received

Instructions from Messrs. Wm. HENDERSON and Co., Irvine, to SELL, as above, at Twelve o'clock.

The MACHINERY was erected new by the Firm at the opening of these Mines a few years ago, and is still in capital order.

## FOR SALE, at NEW PEMBROKE MINE, CORNWALL.—

An excellent 80 in. cylinder PUMPING ENGINE, with FOUR good 12 ton BOILERS.

26 in. DRAWING ENGINE, and TWO BOILERS.

TWO SPARE BOILERS.

THREE IRON STAMPS AXLES.

100 fathoms FLAT RODS, 8¼ inch.

A quantity of ROD PLATES and other MATERIALS.

Apply to Mr. JOHN POLKINGHORNE, PAR OFFICE, PAR STATION.

## PRELIMINARY AUCTION NOTICE.

MR. W. T. DAVEY, Auctioneer, &c., Redruth, has received instructions to SELL, BY AUCTION, in the early part of next month (October, 1877), at WHEEL UNITY WOOD MINE, Scorrier, Cornwall, ONE very first-class 70 in. cylinder PUMPING ENGINE, 10 ft. in cylinder, and 9 ft. in shaft, with first piece of rods and caps, and THREE nearly new 12 ton BOILERS, and fittings complete.

ONE good double-acting 21 in. cylinder STAMPING ENGINE, 6 feet stroke, equal beam, with ONE 10 ton BOILER.

THREE iron STAMPS AXLES, 32 heads, lifters, &c., complete.

60 fms. 20 in. PUMPS, nearly new, &c.

4½ fms. 15 in. ditto ditto With workings and bottoms, complete.

20 fms. 13 in. ditto ditto ditto

10 fms. 9½ in. ditto ditto ditto

50 fms. 15 in. main rods, with strapping plates, &c., complete; 250 fms. nearly new 18 in. best top hemp improved patent shroud laid capstan rope; several horse whips; a quantity of new and useful timber; and all other necessary articles in general use in mines.

Dated Salem House, Scorrier, September 6, 1877.

## COLLIERY IN YORKSHIRE.

## THE MALTON COAL COMPANY (LIMITED).

TO BE SOLD, BY PRIVATE TREATY, A VALUABLE COAL

FIELD, of about 1100 acres, near WAKEFIELD, with Cottages, Siding, and sundry Plant, &c., held, at a very low royalty, under a lease of which 55 years are unexpired. Dead rent, £1000.

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A GOOD SLATE QUARRY FOR SALE.—

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MINE, situated in the renowned district of RHEINISH-PRUSSIA, between DUREN and MECHERNICH. This property is immediately adjoining that of the Anglo-Rhenish Lead Mining Company at Maubach.

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Apply to GEORGE RIDLEY, M.E., Grease Manufacturer, Coal Fitter, and Metal Broker, Trinity Chambers, Quayside, Newcastle-on-Tyne.

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as may be agreed upon, very valuable MINERAL and COAL MINES, extending over an area of about TWO HUNDRED ACRES, near WREXHAM, in the county of DENBIGH, part of the property known as

## THE STANSTY HALL ESTATE,

Containing Main, Powell, and Brassy Coal, varying from three to nearly twelve feet, and the Two Yard Coal, and other good and large Seams of Coal near the Westminister and other Collieries, being the richest and most productive mineral properties in Denbighshire.

Proposals for working the whole or any portion of the above premises, not less than fifty acres, stating the minimum or dead rent recoverable out of royalties in excess of the sum offered, and stating the amount per foot per statute acre offered to be paid for Main, Powell, Brassy, and Two Yard Coal, also per foot per statute acre for all other Seams workable, to be made up to the 24th of September next, to Lady FRANCH, Elm Park, Merriem, Dublin.

Dated 24th August, 1877.

## LEAD MINE NEAR CARSPHAIN, STEWARTRY OF

## KIRKCUDBRIGHT.

TO BE LET, for such number of years as may be agreed upon—

## THE WOODHEAD LEAD MINE,

On the CRAIGENGILLAN ESTATE, situated in the parish of CARSPHAIN and STEWARTRY OF KIRKCUDBRIGHT.

This Mine was opened in 1838, has been wrought ever since, and has yielded a large quantity of lead of the finest quality.

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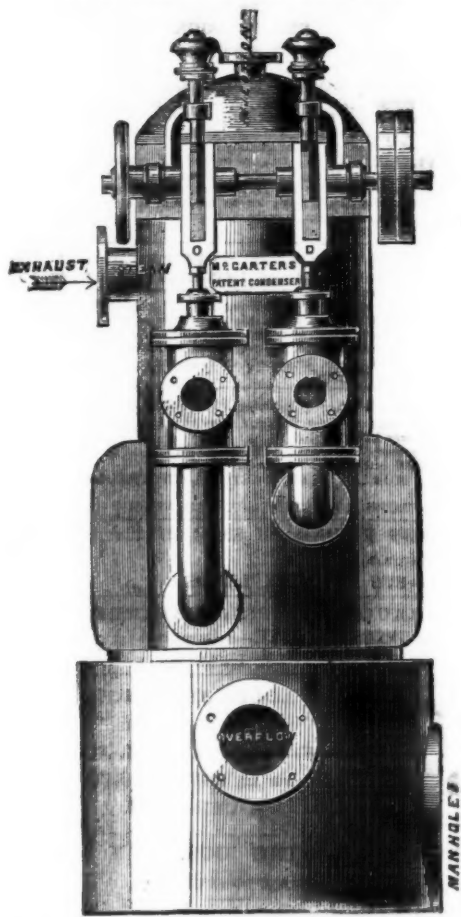
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Condensing and Non-condensing.  
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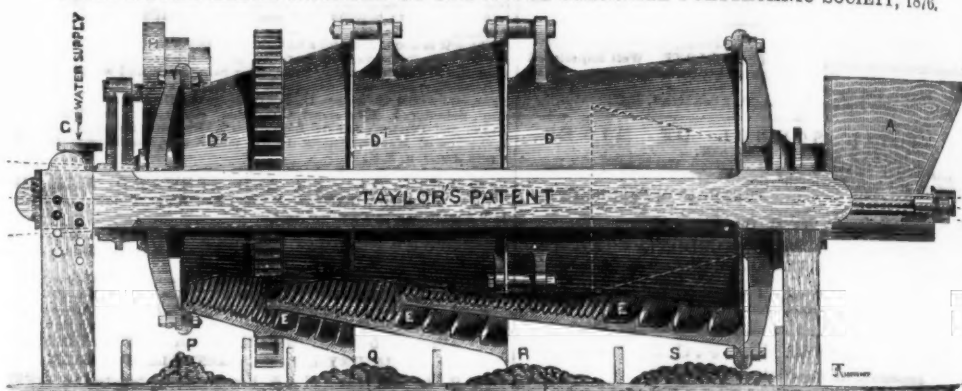
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Mr. TAIT, Manager, East Hetton Quarry Company's Works, Coxhoe, Durham, writing on May 12, 1876, says—"I have pleasure in testifying to the value of your Rock Drills. The two you supplied us with about six months ago are giving us entire satisfaction. The cost of drilling by machine is less THAN ONE-FOURTH THAT OF DRILLING BY HAND. By the use of the Drills we have been able very greatly to increase the out-put of stone without increasing the number of men employed."

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FOR SEPARATING AND SIZING MINERAL AND OTHER SUBSTANCES.

By the aid of this invention any materials, which are of different specific gravity, can be concentrated and sorted mechanically while in the case of ores the fine mineral is brought up with the larger particles instead of being washed into the waste—a most important feature.

This machine uses very little water in proportion to the quantity of material treated, and will be found a most useful and efficient dressing apparatus.

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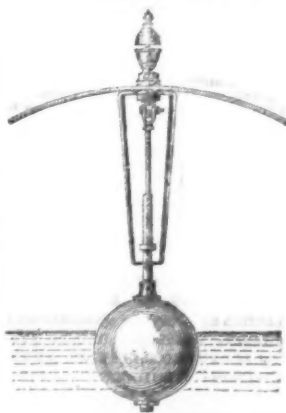
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EXPLOSIONS FROM STEAM BOILERS have become so frequent, and are often attended with such serious results both to life and property, that any improvement tending to secure their prevention cannot fail to be appreciated. From numerous examinations, made after explosions, by professional engineers, the great majority of accidents that occur are considered the result of a defective water in the boilers. Experience has proved that it is good policy to furnish each boiler with this Self-acting Alarm, so constructed that, upon the water getting below a certain level, it can prevent the opening for the steam to act directly upon the instrument and cause the alarm. The hollow cast-iron float is made sufficiently heavy that, on falling with the water, it will fail in opening the orifice, as the apparatus is entirely free from all stuffing-boxes, glands, or any other contrivances which are so frequently found to operate against the proper working of alarms. The float is so constructed that it cannot become waterlogged. As long as the sufficiency of water in the boiler, the alarm valve is kept close against its seat by the float.

A loose pin at the top of the whistle enables anyone to test the alarm at a moment's notice. Practical men consider this the best Alarm hitherto offered. The Engraving shows the mode of fixing to boiler, also the water level. In ordering, the diameter of the boiler should be given, and also the diameter of the flue when there is one, the distance from top of flue to top of boiler, or send sketch.

The use of these Alarms in large works, extending over a period of fifteen years, and saving over 4000, is a guarantee in itself of their efficiency and safety.

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W. and S. FIRTH undertake to CUT, economically, the hardest CANNEL, ANTHRACITE, SHALE, or ORDINARY COAL, to any DEPTH, UP TO FIVE FEET.

Apply.—

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the MOST ECONOMICAL and POWERFUL EXPLOSIVE for every kind of MINING and QUARRYING OPERATIONS; for breaking in hard or soft, wet or dry ROCKS; for clearing land of TREE ROOTS and BOULDER STONES; for rending massive BLOCKS of METAL; for SUBAQUEOUS and TORPEDO purposes; and for recovering or clearing away of WRECKS, &c. ITS SAFETY is evidenced by the total ABSENCE OF ACCIDENTS in transit and storage; it is insensible to heavy shocks. QUANT POWER being only fully developed when fired with a powerful percussion detonator, and hence its great safety. As a SUBSTITUTE FOR GUNPOWDER its advantages are the GREAT SAVING OF LABOUR, rapidity and INCREASE OF WORK done, FEWER and smaller BORE-HOLES required, greater depth blasted, safety in use NO DANGER FROM TAMPING, absence of smoke, unaffected by damp, &c.

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perfectly unflammable and insensible to the heaviest blows. It can only be fired in a bore-hole using a special primer and detonator. Its strength is superior, weight for weight, to every known explosive, and it gives off no injurious taste or fumes.

Sold in cartridges ready for use in wet or dry ground at 1s. 6d. per lb.

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Results of practical experience show a saving of from 15 to 20 per cent. over the strongest explosives previously in use.

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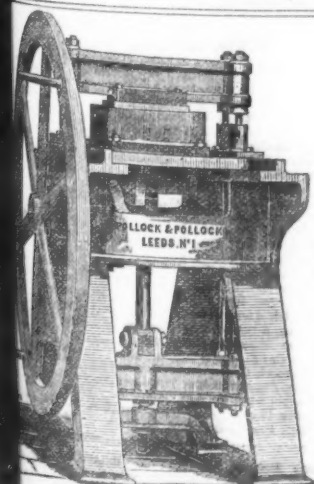
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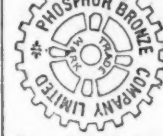
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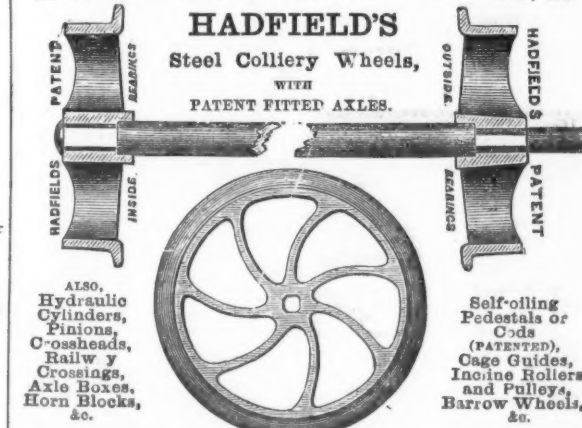
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Share.	Mines.	Paid.	Last wk.	Clos. pr.	Total divs.	Per sh.	Last pd.
1400 Alderley Edge, Cheshire*	1 0 0	—	—	—	12 11 5	0 2 0	Jan. 1876
15000 Balmynheer, W. Wendon (4000 to Is.)	1 0 0	—	—	—	0 2 0	0 2 0	Nov. 1875
30000 Bannymore, c. t. m., Devon*	1 0 0	—	—	—	0 2 0	0 2 0	Nov. 1875
4000 Brockwood, c. Buckfastleigh	1 16 0	—	—	—	3 16 0	0 2 0	Nov. 1877
2000 Bryn Alyn, c. t. Denbigh. (101 sh.)	8 0 0	—	—	—	0 7 0	0 7 0	Jan. 1876
5400 Cashwell, c. Cumberland*	2 10 0	—	—	—	1 9 0	0 2 0	Aug. 1876
10000 Carn Brea, c. t. Illogan†	26 7 6	—	—	—	308 0 0	0 1 0	Feb. 1876
2450 Cook's Kitchen, c. Illogan†	23 17 3	—	—	—	11 17 0	0 7 6	Jan. 1878
10240 Devon Gt. Consols, c. Tavistock†	1 0 0	—	—	—	118 15 0	0 5 0	July 1877
4296 Dolcoath, c. t. Camborne	10 14 10	—	—	—	111 11 3	0 5 0	July 1877
8000 East Black Craig, c. t. Scotland	8 0 0	—	—	—	0 10 0	0 10 0	Feb. 1877
800 East Darren, c. t. Cardiganshire	8 0 0	—	—	—	285 10 0	0 1 0	Aug. 1877
400 East Pool, c. t. Illogan	0 9 9	—	—	—	15 2 3	0 2 0	June 1876
40 Glasgow Carr., c. t. (30,000 £1 p. 10,000 15s. p.)	1 1 1	—	—	—	0 12 10	0 6 0	Mar. 1877
7500 Goresdill and Merlyn Cons., c. t. Flint	2 10 0	—	—	—	0 5 0	0 5 0	Aug. 1877
15000 Great Laxey, c. t. m., Devon*	4 0 0	—	—	—	0 2 0	0 2 0	Apr. 1876
615 Gt. Retallack, c. t. m., Perranarabuth	5 18 6	—	—	—	22 3 0	0 10 0	July 1877
25000 Gt. West Van, c. t. Cardigan*	2 0 0	—	—	—	0 2 0	0 2 0	Aug. 1874
4400 Green Hurth, c. t. Durham	0 6 0	—	—	—	1 15 0	0 3 0	Aug. 1877
20000 Grogwinion, c. t. Cardigan*	2 0 0	—	—	—	0 12 0	0 4 0	Feb. 1877
9830 Gunialake (Clitters), c. t. m.	6 5 0	—	—	—	0 13 9	0 1 0	Oct. 1876
1024 Herodfoot, c. t. near Liskeard†	8 10 0	—	—	—	62 5 0	0 15 0	Oct. 1872
18000 Hingston Down, c. t. Calstock†	0 4 0	—	—	—	0 1 0	0 1 0	Nov. 1875
60000 Holmbush, c. t. s. i., Callington†	1 0 0	—	—	—	0 3 0	0 6 0	Feb. 1876
240 Isle of Man, c. t. s. i., Isle of Man†	26 0 0	—	—	—	82 5 0	0 10 0	Feb. 1876
20000 Leadhills, c. t. Lanarkshire	6 0 0	—	—	—	0 6 0	0 6 0	April 1877
400 Lisburne, c. t. Cardiganshire	18 15 0	—	—	—	582 10 0	0 1 0	July 1877
14000 Llanidloes, c. t. Montgomery	3 0 0	—	—	—	0 9 0	0 4 0	Nov. 1876
6120 Lovell, c. t. Wendron	0 16 0	—	—	—	0 17 6	0 6 0	Jan. 1874
5000 Marke Valley, c. t. Linkinhorne	5 3 8	—	—	—	7 15 0	0 2 0	Jan. 1876
5000 Miners Mining Co., c. t. Wrexham*	1 0 0	—	—	—	67 0 2	0 4 0	May 1877
20000 Mining Co. of Ireland, c. t. s. i.	7 0 0	—	—	—	23 11 8	0 3 6	Jan. 1876
444 North Bury, c. t. Chacewater	3 9 0	—	—	—	1 12 0	0 1 0	July 1877
1159 North Hendre, c. t. Wales	2 10 0	—	—	—	1 12 0	0 1 0	July 1877
6000 Pedu-an-drea Cons., c. t. Redruth	0 8 6	—	—	—	0 9 0	0 9 0	Aug. 1877
5000 Penhalls, c. t. St. Agnes	3 0 0	—	—	—	3 13 6	0 2 0	July 1878
6000 Pennant, c. t. s. i., North Wales*	5 0 0	—	—	—	0 5 0	0 5 0	Mar. 1877
45793 Penstruthal, c. t. Gwynnapp	2 0 0	—	—	—	0 2 8	0 8 0	Nov. 1876
12000 Phoenix & W. Phoenix, c. t. s. i., Link.	3 4 9	—	—	—	2 9 6	0 4 0	Nov. 1872
18000 Prince Patrick, c. t. s. i., Holywell	1 0 0	—	—	—	0 14 0	0 1 3	Jan. 1876
12000 Roman Gravel, c. t. Salop	7 10 0	—	—	—	7 10 6	0 8 6	May 1877
512 South Caradon, c. t. St. Cleer	1 5 0	—	—	—	788 10 0	0 2 0	July 1877
6123 South Condurrow, c. t. Camborne†	6 5 6	—	—	—	2 18 0	0 6 0	Sept. 1877
15000 St. Harmon, c. t. Montgomery	3 0 0	—	—	—	0 3 0	0 3 0	Jan. 1877
10000 So. Fr. Patrick, c. t. s. i. (3000 sh. issued)	1 0 0	—	—	—	0 7 0	0 1 0	Oct. 1876
10000 Tankersley, c. t. Salop	6 0 0	—	—	—	4 17 0	0 5 0	Dec. 1876
20000 Tincroft, c. t. s. i., Illogan†	9 0 0	—	—	—	52 8 6	0 5 0	May 1877
15000 Van, c. t. Llanidloes*	4 5 0	—	—	—	21 11 6	0 16 0	June 1877
2400 W. Chiverton, c. t. Perranarabuth†	12 10 0	—	—	—	65 0 0	0 10 0	Jan. 1877
1759 West Bodice, c. t. Day	10 0 0	—	—	—	1 19 0	0 1 0	July 1878
512 West Valley, c. t. Illogan†	65 10 0	—	—	—	22 5 0	0 1 0	Aug. 1877
3042 West Valley, c. t. Illogan†	23 1 3	—	—	—	0 6 0	0 6 0	Oct. 1872
12000 West Wye Valley, c. t. Montgomery	3 0 0	—	—	—	0 6 0	0 6 0	Aug. 1876
1024 Wh. Eliza Consols, c. t. St. Austell	20 0 0	—	—	—	15 0 0	0 2 0	Aug. 1876
2048 Wh. Eliza Consols, c. t. St. Austell	23 10 0	—	—	—	8 5 0	0 5 0	Aug. 1876
4296 Wh. Eliza Consols, c. t. St. Agnes	5 4 6	—	—	—	11 19 6	0 2 6	Dec. 1874
28300 Wh. Newton, c. t. s. i., Calstock*	1 0 0	—	—	—	0 4 6	0 4 0	June 1877
50 Wh. Owles, c. t. St. Just	86 6 0	—	—	—	523 10 0	0 4 0	Aug. 1875
8000 Wh. Prussia, c. t. Redruth	2 0 0	—	—	—	0 4 0	0 1 0	July 1877
35000 Wicklow, c. t. s. i., Wicklow	2 10 0	—	—	—	52 9 0	0 2 6	Mar. 1872
10000 Wye Valley, c. t. Montgomery*	3 0 0	—	—	—	0 10 6	0 4 0	Oct. 1876

## FOREIGN DIVIDEND MINES.

Share.	Mines.	Paid.	Last wk.	Clos. pr.	Total divs.	Per sh.	Last pd.
85000 Alamillos, c. t. Spain†	2 0 0	—	—	—	1 17 3	0 1 0	Mar. 1877
80000 Almadena and Tinto Consol., c. t.†	1 0 0	—	—	—	0 6 3	0 1 0	May 1876
20000 Australian, c. t. South Australia†	7 7 8	—	—	—	0 19 6	0 1 0	Nov. 1877
10000 Battle Mountain, c. t. (2500 part pd.)	5 0 0	—	—	—	0 10 0	0 10 0	Nov. 1877
15000 Birdseye Creek, c. t. California*	4 0 0	—	—	—	0 14 0	0 2 6	June 1876
12500 Burra Burra, c. t. s. i., Australia	5 0 0	—	—	—	70 0 0	0 10 0	Oct. 1872
20000 Capa Copper Mining, c. t. So. Africa	7 0 0	—	—	—	29 18 0	0 1 0	June 1877
40000 Cedar Creek, c. t. California*	5 0 0	—	—	—	0 6 0	0 6 0	July 1873
15000 Chicago, c. t. Utah*	10 0 0	—	—	—	2 12 0	0 4 0	Nov. 1876
10000 Colorado United, c. t. Colorado*	10 0 0	—	—	—	0 13 0	0 4 0	Jan. 1876
10000 Copiapo, c. t. Chili† (2500 shares)	18 15 6	—	—	—	7 11 5	0 3 0	May 1877
100000 Don Pedro North del Rey†	0 16 0	—	—	—	2 5 9	0 2 0	Mar. 1872
23500 Eberhardt & Aurora, c. t. Nevada†	10 0 0	—	—	—	1 8 0	0 1 0	Dec. 1876
70000 English & Australian, c. t. St. Aust.	2 10 0	—	—	—	2 15 0	0 3 0	Mar. 1877
90000 Flagstaff, c. t. Utah*	10 0 0	—	—	—	4 20 0	0 1 0	Mar. 1877
25000 Fortuna, c. t. Spain†	2 0 0	—	—	—	6 9 2	0 6 0	July 1873
50000 Frontino & Bolivia, c. t. New Gran.*†	2 0 0	—	—	—	0 1 0	0 1 0	Mar. 1877
9000 Gold Run, c. t. s. i.	1 0 0	—	—	—	0 2 4	0 4 0	Oct. 1872
60000 Kapunda Mining Co. Australia†	1 3 0	—	—	—	0 2 4	0 6 0	June 1873
20000 Last Chance, c. t. Utah	5 0 0	—	—	—	0 14 0	0 2 0	July 1873
15000 Linares, c. t. Spain†	3 0 0	—	—	—	16 17 2	0 9 0	July 1873
50000 London and California, c. t.†	3 0 0	—	—	—	0 1 0	0 1 0	July 1873
7871 Lusitania, Portugal† (25 sh.)	3 10 0	—	—	—	1 11 6	0 1 0	July 1873
5000 Mamm Copperopolis of Utah, c. t. 10 sh.	10 0 0	—	—	—	0 5 0	0 5 0	Dec. 1873
5000 Mountain Chief, c. t. Utah*	10 0 0	—	—	—	0 4 0	0 4 0	Jan. 1877
10000 Pontbland, c. t. s. i., France†	20 0 0	—	—	—	23 1 1	1 11 1	Nov. 1876
100000 Port Phillip, c. t. Clunes†	1 0 0	—	—	—	1 8 0	0 1 0	Jan. 1877
40000 Richmond Consols, c. t. Nevada†	5 0 0	—	—	—	3 9 0	0 7 6	Oct. 1876
40000 Santa Barbara, c. t. Brazil	0 10 0	—	—	—	0 39 0	0 13 0	Mar. 1877
10000 Scottish Australian Mining Co.†	1 0 0	—	—	—	15 per cent.	—	June 1877
50000 Scottish Australian Mining Co., New	2 0 0	—	—	—	15 per cent.	—	June 1877
112500 Sierra Buttes, c. t. California*	2 0 0	—	—	—	1 15 0	0 2 0	Oct. 1876
40000 South Aurora, c. t. Nevada*	5 0 0	—	—	—	0 14 2	0 2 0	Nov. 1873
253000 St. John del Rey† (25 stock & multiples dealt in)	200 210	—	—	—	1 1 1	20 p. cent.	Dec. 1876
23060 Tulima, c. t. So. America	5 0 0	—	—	—	0 11 6	0 6 0	Mar. 1874
18600 Victoria (London), c. t. Australia	1 0 0	—	—	—	0 11 10	0 10 0	Aug. 1876
18600 Western Andes, c. t. New Granada	5 0 0	—	—	—	12 per cent.	—	Aug. 1876
21500 W. Prussia (8500 pref. sh. 101 pd.)	10 0 0	—	—	—	1 4 0	0 8 0	April 1877

## NON-DIVIDEND FOREIGN MINES.

Share.	Mines.	Paid.	Last wk.	Clos. pr.	Last wk.
20000 Anglo-Australian, c. t. Victoria*	2 10 0	—	—	—	—
5000 Anguilla Phosphate, West Indies (4000 issued)	10 0 0	—	—	—	—
12000 Argentine, c. t. Argentine Republic	5 0 0	—	—	—	—
10000 Australian Central, c. t. (also 6000 deferred shares)	1 0 0	—	—	—	—
3000 Bellavista, c. t. Peru (210 shares)	10 0 0	—	—	—	—
3000 Blue Tent, c. t. California	5 0 0	—	—	—	—
25000 Censura Sulphur Company, Romagna, Italy*	10 0 0	—	—	—	—
49250 Condes de Chilli, c. t. Nicaragua*	2 0 0	—	—	—	—
15000 Exchequer, c. t. California†	5 0 0	—	—	—	—
100000 Exchequer, c. t. California†	1 0 0	—	—	—	—
40000 Holcombe Valley, c. t. California	1 0 0	—	—	—	—
8000 Hornachos, c. t. Spain	10 0 0	—	—	—	—
12000 Hualfai, c. t. s. i., Orebro, Sweden	5 0 0	—	—	—	—
00000 Imperial Brazilian Collieries, Brazil*	5 0 0	—	—	—	—
100000 I. A. L., c. t. California*	1 0 0	—	—	—	—
50000 Javali, c. t. Nicaragua*	2 0 0	—	—	—	—
3500 La Mancha, c. t. Newfoundland	10 0 0	—	—	—	—
12000 Lanestosa, c. t. s. i., Vizcaya, Spain (25 shares)	1 15 0	—	—	—	—
75000 Maibor, c. t. Colombia* (21765 issued)	1 0 0	—	—	—	—
40000 Malpais, c. t. Colombia* (7400 pref. shares, fully paid)	1 0 0	—	—	—	—
20000 Menzies, c. t. s. i., Germany*	5 0 0	—	—	—	—
4588 New Bensberg, c. t. Germany*	5 0 0	—	—	—	—
60000 New Queensland, c. t. Venezuela*	5 0 0	—	—	—	—
20000 New Zealand Kapanga, c. t. Coromandel†	5 0 0	—	—	—	—
3000 Oregon, c. t. Oregon, U.S. (preference shares)	4 0 0	—	—	—	—
50000 Panulicillo, c. t. Chili† (25000 debentures)	4 0 0	—	—	—	—
50000 Pastavina United, c. t. Italy*	3 0 0	—	—	—	—
50000 Providencia and New Rosario, c. t. Mexico*	1 0 0	—	—	—	—
50000 Rica, c. t. Colombia* (40000 issued)	1 0 0	—	—	—	—
25,150,000 Rio Tinto, c. t. Huelva, Spain	1 0 0	—	—	—	—
100000 Rosa Grande, c. t. Brazil† (21 shares)	0 10 0	—	—	—	—
25000 Russia Copper, Orenburg and Ufa†	3 0 0	—	—	—	—
10000 Silver Star, c. t. Colorado*	2 0 0	—	—	—	—
80000 Tecoma, c. t. Utah*	1 0 0	—	—	—	—
20000 Thornhill Reef, c. t. Australia*	10 0 0	—	—	—	—
43174 United Mexican, c. t. Mexico†	1 0 0	—	—	—	—
14000 Utah, c. t. s. i., Utah*	28 15 3	—	—	—	—
15000 Yorke Peninsula, c. t. South Australia	5 0 0	—	—	—	—
40000 Yorke Peninsula, c. t. South Australia	1 0 0	—	—	—	—

## FOREIGN AND MISCELLANEOUS STOCKS, BONDS, LOANS, AND TRUSTS.

Closing Prices.		Closing Prices.	
Argentina, 1886, 5 per cent.	67 60	Foreign and Col. Gov. Trust, 5 p. ct.	66 71
Bolivia, 6 per cent.	23 31	Do., 5 per cent, 2d issue	63 58
Brazilian, 1865, 5 per cent.	93 95	Do., 6 per cent, 1st issue	63 58
Chilian, 1866, 7 per cent.	99 102	Do., 1872, 4th issue	61 65
City of Providence, 5 p.c. coupon bonds	100 100	Do., 1872, 5th issue	61 65
Egyptian, 5 per cent. pref.	59 60	Peruvian, 1870, 6 per cent.	13 1/2 13 1/2
Do., unified debt, scrip	36 37	Russian, 5 1/2 per cent.	11 1/2 11 1/2
Do., 7 per cent., V.M.L.	56 58	United States 6 per cent. Mort.	94 98
Do., 9 per cent., guar.	74 76	Spanish, Quiksilver Mort.	91 96
Do., 7 per cent., K.M.L.	44 45	United States Mort., 6 per cent.	97 99